AR TARGET SHEET

The following document was too large to scan as one unit, therefore, it has been divided into sections.

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SECTION: 2 OF 2

DOCUMENT #: 07-AMCP-0290

TITLE: 200-SW-1 Nonradioactive Landfills and Dumps Group OU and 200-SW-2 Radioactive Landfills and Dumps Group OU Remedial Investigation/Feasibility Study Work Plan, DOE/RL-2004-60 Draft B and TPA Interim Milestone M-13-07-03 Change Package

APPENDIX A

SAMPLING AND ANALYSIS PLAN FOR THE 200-SW-2 OPERABLE UNIT LANDFILLS

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TERMS

ALARA	as low as reasonably achievable
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COPC	contaminant of potential concern
DOE	U.S. Department of Energy
DPT	direct-push techniques
DQA	data quality assessment
DQO	data quality objective
Ecology	Washington State Department of Ecology
EMI	electromagnetic induction
EPA	U.S. Environmental Protection Agency
FFTF	Fast Flux Test Facility
FSP	field-sampling plan
GPR	ground-penetrating radar
HEIS	*Hanford Environmental Information System* database
HGET	Hanford General Employee Training
HISS	Hanford Inactive Site Survey
N/A	not applicable
ng	nanogram
OU	operable unit
QA	quality assurance
QAPjP	quality assurance project plan
QC	quality control
RCRA	*Resource Conservation and Recovery Act of 1976*
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RL	DOE, Richland Operations Office
SAP	sampling and analysis plan
TMF	total magnetic field
Tri-Parties	DOE, EPA, and Ecology
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989a)
TSD	treatment, storage, and/or disposal (unit)
VOC	volatile organic compound
WAC	*Washington Administrative Code*
WSP	Washington State Plane

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METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If you know	*Multiply by*	*To get*	*If you know*	*Multiply by*	*To get*
Length			**Length**		
inches	25.40	millimeters	millimeters	0.0394	inches
inches	2.54	centimeters	centimeters	0.394	inches
feet	0.305	meters	meters	3.281	feet
yards	0.914	meters	meters	1.094	yards
miles (statute)	1.609	kilometers	kilometers	0.621	miles (statute)
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.0929	sq. meters	sq. meters	10.764	sq. feet
sq. yards	0.836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.591	sq. kilometers	sq. kilometers	0.386	sq. miles
acres	0.405	hectares	hectares	2.471	acres
Mass (weight)			**Mass (weight)**		
ounces (avoir)	28.349	grams	grams	0.0353	ounces (avoir)
pounds	0.453	kilograms	kilograms	2.205	pounds (avoir)
tons (short)	0.907	ton (metric)	ton (metric)	1.102	tons (short)
Volume			**Volume**		
teaspoons	5	milliliters	milliliters	0.034	ounces (U.S., liquid)
tablespoons	15	milliliters	liters	2.113	pints
ounces (U.S., liquid)	29.573	milliliters	liters	1.057	quarts (U.S., liquid)
cups	0.24	liters	liters	0.264	gallons (U.S., liquid)
pints	0.473	liters	cubic meters	35.315	cubic feet
quarts (U.S., liquid)	0.946	liters	cubic meters	1.308	cubic yards
gallons (U.S., liquid)	3.785	liters			
cubic feet	0.0283	cubic meters			
cubic yards	0.764	cubic meters			
Temperature			**Temperature**		
Fahrenheit	(°F-32)*5/9	Centigrade	Centigrade	(°C*9/5)+32	Fahrenheit
Radioactivity			**Radioactivity**		
picocurie	37	millibecquerel	millibecquerel	0.027	picocurie

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APPENDIX A

SAMPLING AND ANALYSIS PLAN FOR THE 200-SW-2 OPERABLE UNIT LANDFILLS

A1.0 INTRODUCTION

The activities described in this sampling and analysis plan (SAP) are intended to support the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) remedial investigation/feasibility study (RI/FS) process for the 200-SW-2 Radioactive Landfills and Dumps Operable Unit (200-SW-2 OU). Sampling activities for the landfills in the 200-SW-1 Nonradioactive Landfills and Dumps Operable Unit (200-SW-1 OU) are not addressed in this SAP, because these landfills are proposed to undergo closure independent of the RI/FS process. Discussion of the 200-SW-1 OU in this SAP is for informational purposes only.

The purpose of this Phase I-B SAP is to continue nonintrusive reconnaissance-level radiological, geophysical, and soil-gas surveys in landfill areas not previously addressed in the Phase I-A data quality objective (DQO) summary report as discussed in Section 4.2 of the RI/FS work plan. Limited intrusive investigations also will be conducted using direct-pushes near the centers of all landfills to better understand the lateral continuity of geologic layers based on lithologic logs from surrounding groundwater-monitoring wells. Fine-grained sediment layers are of particular interest because they tend to impede the downward movement of moisture and mobile contaminants through the vadose zone. Additional direct-pushes will occur in portions of landfills potentially impacted by atypical moisture from rapid melting of snow and seepage from a nearby wastewater ditch.

Data from this SAP will guide preparation of DQOs, work plans, and SAPs for future intrusive-phase investigations to determine the nature and extent of landfill contamination. Data from future site investigation phases will be used to refine conceptual contaminant distribution models, support baseline risk assessments, and evaluate remediation technology performance in support of the feasibility study, proposed plan, and eventual record of decision for 200-SW-2 OU landfills.

Characterization activities described in this plan are based on the implementation of the DQO process as documented in SGW-33253, *Data Quality Objectives Summary Report for the 200-SW-2 Operable Unit Landfills.*

This chapter provides general background information about the OU, contaminants of potential concern (COPC), and potential preliminary remediation goals (PRG), and a summary of DQOs identified for the landfills. Subsequent chapters of this SAP present the quality assurance project plan (QAPjP), the field-sampling plan (FSP), and the health and safety and waste management requirements.

A1.1 BACKGROUND

The *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al., 1989a) identifies 800+ soil waste sites (and associated structures) resulting from the discharge of liquids and solids to the ground from 200 Areas processing facilities. These 800+ sites have been arranged into separate waste groups (operable units) that contain CERCLA past-practice sites, *Resource Conservation and Recovery Act of 1976* (RCRA) past-practice sites addressed through RCRA corrective action authorities, and RCRA treatment, storage, and/or disposal (TSD) units.

In accordance with the Tri-Party Agreement, the RI/FS work plan has been prepared to present information on how the RI/FS process will be conducted and eventually will lead to proposed remedies for the waste sites in the 200-SW-2 OU. Also in accordance with the Tri-Party Agreement, the Washington State Department of Ecology (Ecology) has been designated as the lead regulatory agency for the 200-SW-2 OU. The RI/FS work plan follows the CERCLA format, with modifications to concurrently satisfy RCRA corrective action and TSD unit closure requirements as described in DOE/RL-98-28, *200 Areas Remedial Investigation/Feasibility Study Implementation Plan – Environmental Restoration Program.*

The 200-SW-2 OU consists of 24 landfills located in the Hanford Site's 200 East and 200 West Areas. The 200 Areas are located near the center of the Hanford Site in south-central Washington State and are within one of three areas on the Hanford Site that are on the U.S. Environmental Protection Agency's (EPA) National Priorities List under CERCLA (40 CFR 300, "National Oil and Hazardous Substances Pollution Contingency Plan," Appendix B, "National Priorities List"). Figure A1-1 shows the location of the Hanford Site and the 200 East and West Areas within. Figure A1-2 shows the 200-SW-2 OU landfill locations that are part of the 200 East Area. Figure A1-3 shows the 200-SW-2 OU landfill locations that are part of the 200 West Area. Table A1-1 provides a summary listing of the 24 landfills included in the 200-SW-2 OU. Additional detail on each of these landfills is provided in Chapter 2.0 of the RI/FS work plan.

The majority of waste disposed to the 200-SW-2 OU landfills originated from the processing facilities located in the 200 East and 200 West Areas of the Hanford Site. The 200-SW-2 OU landfills also contain some wastes that originated from the Hanford Site's 100 and 300 Areas, as well as from offsite sources.

Figure A1-1. Location of the Hanford Site.

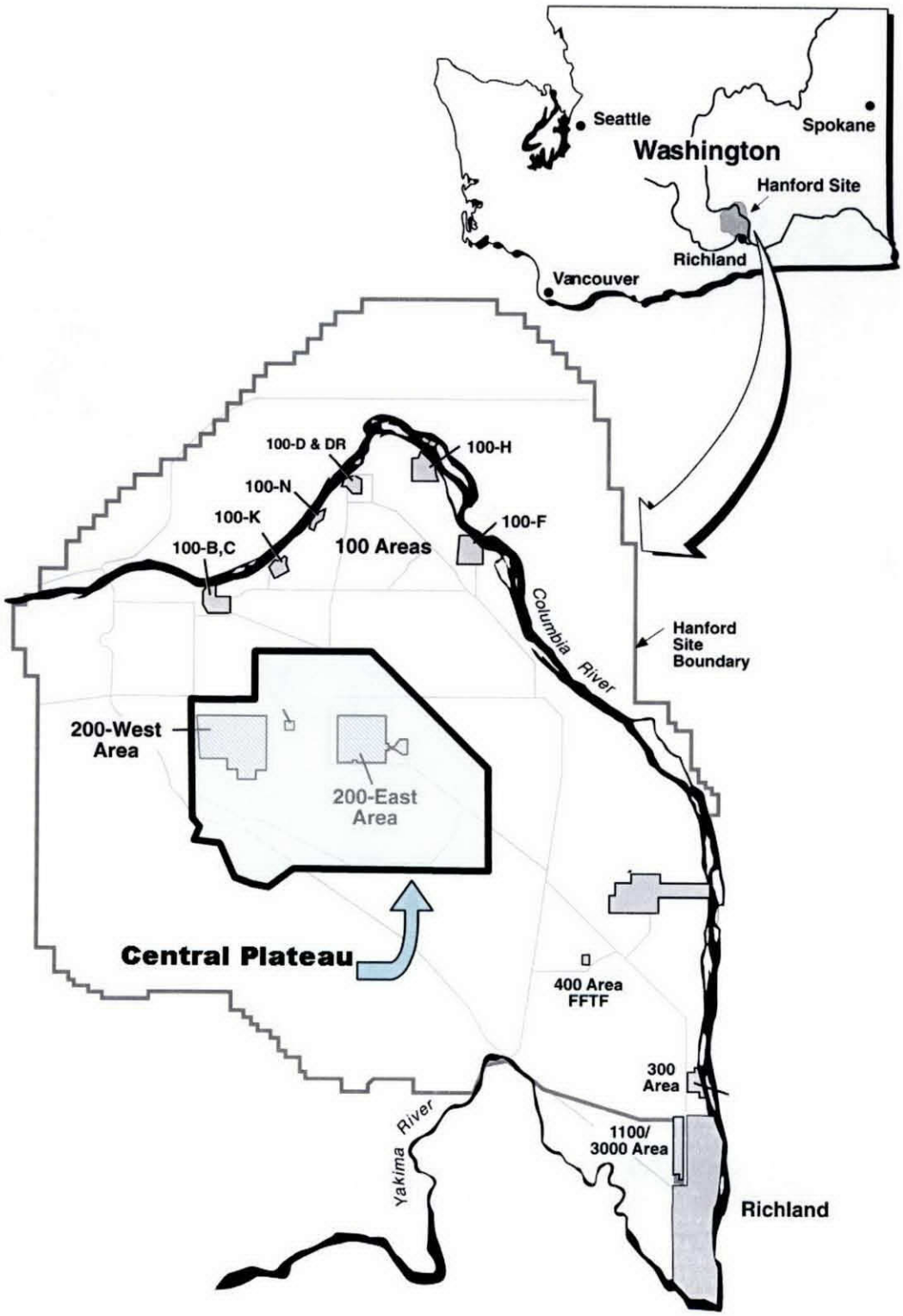

Figure A1-2. Location of 200-SW-2 Operable Unit Landfills in the 200 East Area.

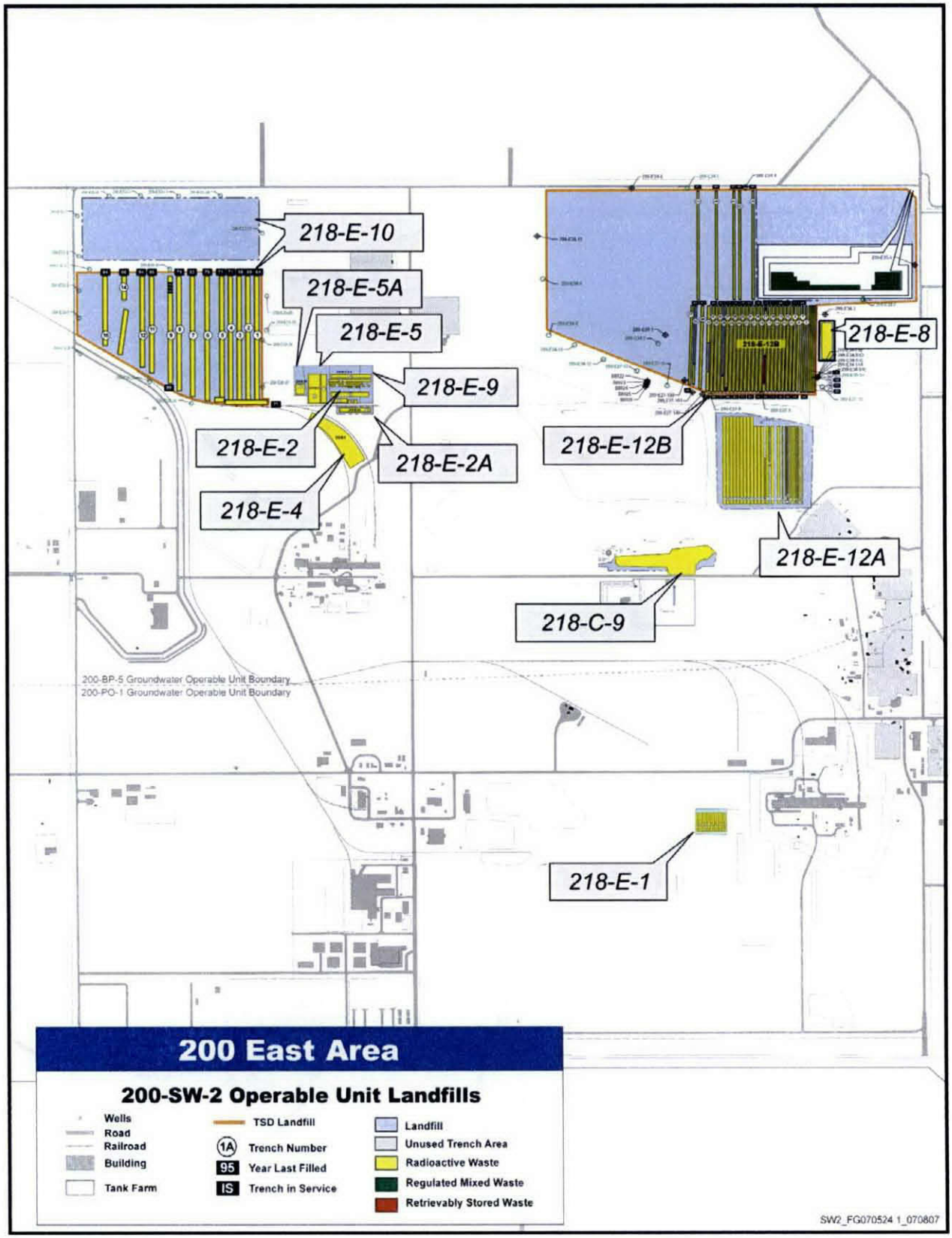

Figure A1-3. Location of 200-SW-2 Operable Unit Landfills in the 200 West Area.

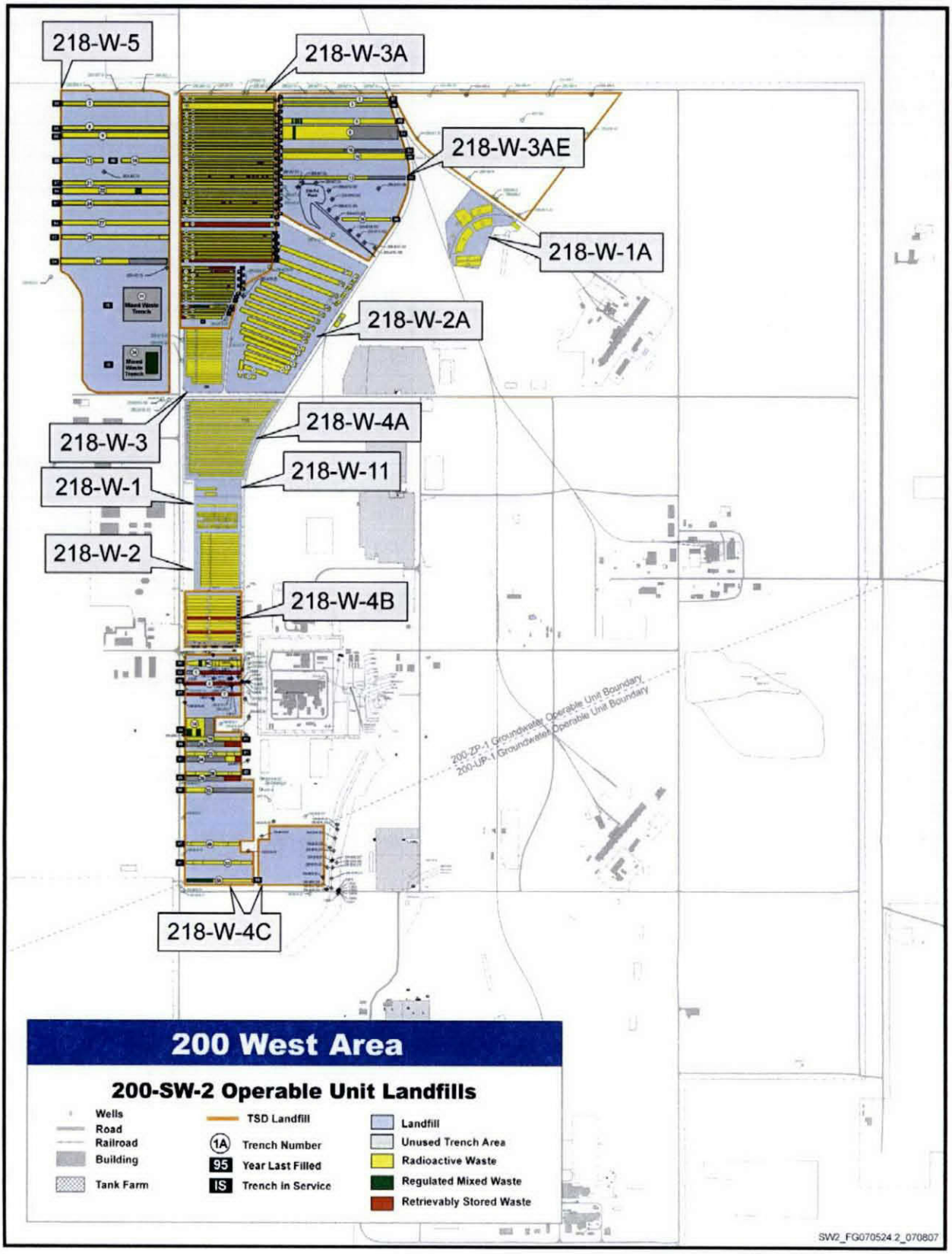

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Table A1-1. 200-SW-2 Operable Unit Landfills.

Site Code	Site Name	Bin Identification
218-E-10	Equip Burial #10	*Bin 1 – TSD Unit Landfills*
218-E-12B	Dry Waste #12B	*Bin 1 – TSD Unit Landfills*
218-W-3A	Dry Waste #3A	*Bin 1 – TSD Unit Landfills*
218-W-3AE	Dry Waste #3AE	*Bin 1 – TSD Unit Landfills*
218-W-4B	Dry Waste #4B	*Bin 1 – TSD Unit Landfills*
218-W-4C	Dry Waste #4C	*Bin 1 – TSD Unit Landfills*
218-W-5	Low Level Radioactive Mixed Waste Landfill	*Bin 1 – TSD Unit Landfills*
218-E-2A	Regulated Equip Storage	*Bin 2 – Industrial Landfill*
218-E-2	Equip Burial #2	*Bin 2 – Industrial Landfills*
218-E-5	Equip Burial #5	*Bin 2 – Industrial Landfills*
218-E-5A	Equip Burial #5A	*Bin 2 – Industrial Landfills*
218-E-9	200E Regulated Equipment Storage Site No. 009, Burial Vault (HISS)	*Bin 2 – Industrial landfills*
218-W-11	Regulated Storage Site	*Bin 2 – Industrial Landfills*
218-W-1A	Equip Burial #1	*Bin 2 – Industrial Landfills*
218-W-2A	Equip Burial #2	*Bin 2 – Industrial Landfills*
218-W-1	Solid Waste Burial #1	*Bin 3 – Dry Waste Alpha Landfills*
218-W-2	Dry Waste #2	*Bin 3 – Dry Waste Alpha Landfills*
218-W-3	Dry Waste #3	*Bin 3 – Dry Waste Alpha Landfills*
218-W-4A	Dry Waste #4A	*Bin 3 – Dry Waste Alpha Landfills*
218-E-1	Dry Waste #1	*Bin 4 – Dry Waste Landfills*
218-E-12A	Dry Waste #12A	*Bin 4 – Dry Waste Landfills*
218-C-9	Dry Waste & 216-C-9 Pond	*Bin 5 – Construction Landfills*
218-E-4	Equip Burial #4	*Bin 5 – Construction Landfills*
218-E-8	200E Construction Burial	*Bin 5 – Construction Landfills*

HISS = Hanford Inactive Site Survey.
TSD = treatment, storage, and/or disposal (unit).

A1.2 WASTE SITE BINNING

The 24 landfills in the 200-SW-2 OU have been sorted into six main categories/bins based on similar characteristics. This sorting is anticipated to aid in choosing appropriate remedial paths, based primarily on the results of the feasibility study and evaluation of candidate remedial alternatives. The bins have been established based on a number of factors including waste volume, waste type, waste form, disposal practices, periods of landfill operations, homogeneity of waste, and potential risk, among others. The new bins are as follows:

- *Bin 1 – TSD Unit Landfills*
- *Bin 2 – Industrial Landfills*
- *Bin 3 – Dry Waste Alpha Landfills*
- *Bin 4 – Dry Waste Landfills*
- *Bin 5 – Construction Landfills*
- *Bin 6 – Caissons.*

The following paragraphs provide a brief description of each bin.

- **Bin 1 – TSD Unit landfills** – This bin includes landfills that are permitted as RCRA TSD units and are included in the Low-Level Burial Ground Part A Permit (DOE/RL-88-20, *Hanford Facility Dangerous Waste Permit Application, Low-Level Burial Grounds*). This bin coincides with the original Bin 3A grouping from the Phase I-A DQO. The majority of available historical documentation is associated with these sites (approximately 110,000 of 147,000 total documents); the sites, therefore, are considered the best-documented sites in the scope of the RI/FS work plan. Sites in this bin include 218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, 218-W-5, 218-E-10, and 218-E-12B.

  This bin also includes sites for which available historical documentation indicates that no burials have been made and there is a low potential for contamination, but some questions remain. Sites in this bin include annexes of 218-W-4C and 218-E-10 and unused portions of 218-E-12B.

- **Bin 2 – Industrial landfills** – This bin includes past-practice landfills that received radioactive waste that was usually packaged in large wooden or concrete boxes, containing large quantities of fission products. For the most part, these sites were restricted to burial of large pieces of failed or obsolete equipment from the chemical processing facilities, although some items came from the 100 Areas. Many of these sites contain burials made over 50 years ago. Historical burial documentation is good for the 218-W-2A and 218-E-5A Landfills; however, historical burial documentation for the remaining sites is at a minimum. Sites in this bin include 218-W-2A, 218-E-5A, 218-E-2, 218-E-2A, 218-E-5, 218-E-9, 218-W-1A, and 218-W-11 Landfills.

- **Bin 3 – Dry Waste Alpha landfills** – This bin includes past-practice landfills that received radioactive waste packaged primarily in fiberboard or small wooden boxes, wrapped in heavy brown paper or burlap, or placed in the trench without packaging. A small proportion of the waste is packaged in metal drums. All types of miscellaneous wastes, including contaminated soils and potentially contaminated rags, paper, wood, and small pieces of equipment such as tools, have been placed in these sites. Some larger

equipment (e.g., motor vehicles, large canyon processing equipment) is known to have been disposed to these sites. Available historical documentation indicates that these sites contain at least 90 percent of the 200 Areas landfill pre-1970 alpha inventory. Available historical documentation for the older burial grounds (218-W-1 and 218-W-2 Landfills) in this bin generally is poor, because these landfills received waste in the 1940s and 1950s. Available historical documents for the newer burial grounds (218-W-3 and 218-W-4A) in this bin are more numerous, because these burial grounds received waste in the mid-1950s to 1960s.

- **Bin 4 – Dry Waste landfills** – This bin includes past-practice landfills that received radioactive waste packaged primarily in fiberboard or small wooden boxes, wrapped in heavy brown paper or burlap, or placed in the trench without packaging. A small proportion of the waste is packaged in metal drums. All types of miscellaneous wastes, including contaminated soils and potentially contaminated rags, paper, and wood, have been placed in these sites. These sites also contain a few pieces of large equipment such as tank farm pumps. Available historical documentation for these sites is generally poor. Sites included in this bin include 218-E-1 and 218-E-12A Landfills.

- **Bin 5 – Construction landfills** – This bin includes past-practice landfills that mainly were limited to burial of wastes resulting from construction work on existing facilities or demolition of surplus facilities. Wastes in these sites are believed to contain very little alpha contamination; beta-gamma contamination is likely also at a minimum. Documentation for 218-C-9 Landfill is believed to be nearly complete; however, available historical documents for 218-E-8 and 218-E-4 Landfills are few.

- **Bin 6 – Caissons** – This bin includes caissons and vertical pipe units used for disposal of hot-cell waste or high plutonium concentration waste in the 218-W-4A and 218-W-4B Landfills. The vertical pipe units in the 218-W-4A Landfill were made of welded 208.2 L (55-gal) drums or corrugated pipe and concrete; the caissons in 218-W-4B Landfill were made of metal and/or concrete. Documentation for the caissons in 218-W-4A Landfill generally is poor, while the documentation for the caissons in 218-W-4B Landfill generally is more numerous (150 to 250 documents per caisson). Caissons located in this bin include 218-W-4B-C1, 218-W-4B-C2, 218-W-4B-C3, 218-W-4B-C4, 218-W-4B-C5, 218-W-4B-C6, 218-W-4B-CU1, 218-W-4A-C1, 218-W-4A-C2, 218-W-4A-C3, and 218-W-4A-C5 Caissons. This bin also includes caissons in 218-W-4A and 218-W-4B Landfills that are believed to be empty/unused, according to available historical documentation. These include 218-W-4A-C4, 218-W-4A-C6, 218-W-4A-C7, and 218-W-4A-C8 Caissons.

A2.0 QUALITY ASSURANCE PROJECT PLAN

The QAPjP establishes the quality requirements for environmental data collection, including sampling, field measurements, and laboratory analysis. This QAPjP complies with the requirements of the following:

- DOE O 414.1C, *Quality Assurance*
- 10 CFR 830 Subpart A, "Quality Assurance Requirements"
- EPA/240/B-01/003, *EPA Requirements for Quality Assurance Project Plans*, EPA QA/R-5.

The following sections describe the quality requirements and controls applicable to the remedial investigation (RI).

A2.1 PROJECT MANAGEMENT

This section addresses the basic areas of project management, and describes how project management will ensure that the project has a defined goal, that the participants understand the goal and approach to be used, and that the planned outputs have been appropriately documented. Project management roles and responsibilities discussed in this section apply to the major activities covered under the work plan and SAP including radiological, geophysical, and soil vapor surveys; and direct-push well installations and logging.

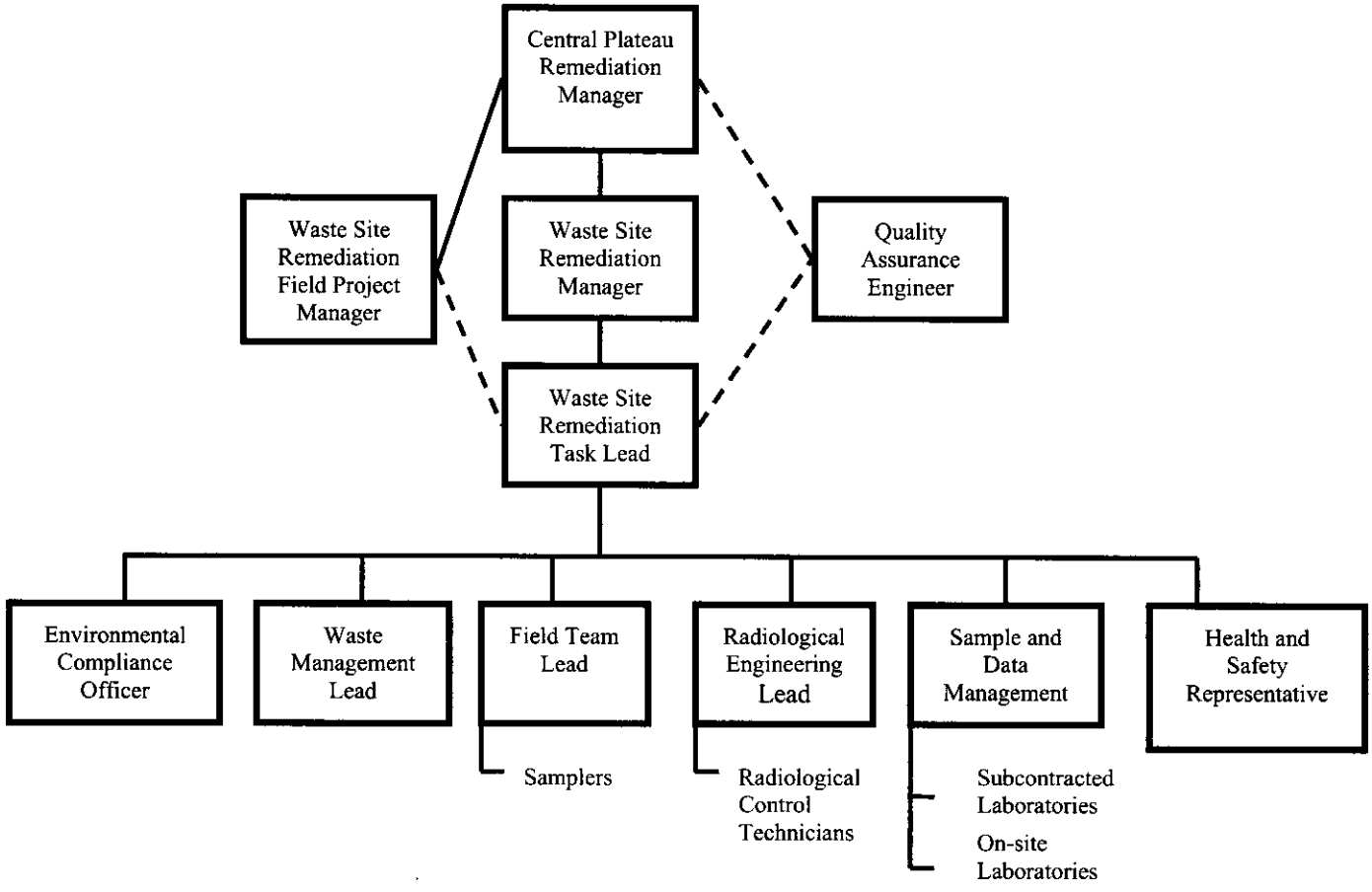
A2.1.1 Project/Task Organization

The Project Hanford Management Contractor is responsible for planning, coordinating, sampling, preparing, packaging, and shipping soil samples to the laboratory. The project organization is described in the subsections that follow and is shown graphically in Figure A2-1.

A2.1.1.1 Central Plateau Remediation Manager

The Central Plateau Remediation Manager has overall authority over the work scope in the RI/FS work plan and SAP; the Manager provides project-level oversight and coordinates with U.S. Department of Energy (DOE), Richland Operations Office (RL) and the regulators in support of Central Plateau remediation activities, including sampling activities. The Central Plateau Remediation Manager interfaces with the Soil and Groundwater Remediation Vice President and the Project Hanford Management Contractor Senior Vice President and President. The Central Plateau Remediation Manager provides support to the Waste Site Remediation Manager to ensure that the work is performed safely and cost effectively.

Figure A2-1. Project Organization.



A2.1.1.2 Waste Site Remediation Manager

The Waste Site Remediation Manager provides oversight for all activities and coordinates with the Central Plateau Remediation Manager, RL, and the regulators in support of sampling activities. In addition, the manager provides support to the Waste Site Remediation Task Lead to ensure that the work is performed safely and cost-effectively.

A2.1.1.3 Waste Site Remediation Task Lead

The Waste Site Remediation Task Lead is responsible for direct management of sampling documents and requirements, field activities, and subcontracted tasks. The task lead works closely with quality assurance (QA), health and safety, and the Field Team Lead to integrate these and the other lead disciplines in planning and implementing the work scope. The task lead also coordinates with, and reports to, RL and the Project Hanford Management Contractor on all sampling activities. The task lead supports RL in coordinating sampling activities with the regulators. The Waste Site Remediation Task Lead maintains the approved QAPjP.

A2.1.1.4 Waste Site Remediation Field Project Manager

The Waste Site Remediation Field Project Manager is responsible for coordinating field support resources and activities for the Waste Site Remediation Task Lead. The Field Project Manager ensures that field documentation is approved and properly implemented and that management is briefed on daily activities. The Field Project Manager coordinates obtaining equipment, personnel, and site support and has real-time direction of field activities and field decisions that affect sampling. The Field Project Manager has real-time responsibility for ensuring the QAPjP and SAP are followed in the field.

A2.1.1.5 Quality Assurance Engineer

The Quality Assurance Engineer is matrixed to the Central Plateau Remediation Manager and the Waste Site Remediation Task Lead and is responsible for QA issues on the project. Responsibilities include oversight of project QA requirements implementation, review of project documents including SAPs (and the QAPjP), and participation in QA assessments on sample collection and analysis activities, as appropriate.

A2.1.1.6 Waste Management Lead

The Waste Management Lead communicates policies and procedures and ensures project compliance for storage, transportation, disposal, and waste tracking in a safe and cost-effective manner. Other responsibilities include identifying waste management sampling/characterization requirements to ensure regulatory compliance interpretation of the characterization data to generate waste designations, profiles, and other documents that confirm compliance with waste acceptance criteria.

A2.1.1.7 Environmental Compliance Officer

The Environmental Compliance Officer provides technical oversight, direction, and acceptance of project and subcontracted environmental work and develops appropriate mitigation measures with a goal of minimizing adverse environmental impacts. The Environmental Compliance Officer also reviews plans, procedures, and technical documents to ensure that all environmental requirements have been addressed; identifies environmental issues that affect operations and develops cost-effective solutions; and responds to environmental/regulatory issues or concerns raised by the DOE and/or regulatory staff.

A2.1.1.8 Field Team Lead

The Field Team Lead has the overall responsibility for the planning, coordination, and execution of the field characterization activities. Specific responsibilities include converting the sampling design requirements into field task instructions that provide specific direction for field activities. Responsibilities also include directing training, mock-ups, and practice sessions with field personnel to ensure that the sampling design is understood and can be performed as specified. The Field Team Lead communicates with the Waste Site Remediation Task Lead to identify field constraints that could affect the sampling design. In addition, the Field Team Lead directs the procurement and installation of sampling materials and equipment needed to support the fieldwork.

The Field Team Lead oversees field-sampling activities that include sample collection, packaging, provision of certified clean sampling bottles/containers, and documentation of sampling activities in controlled logbooks, chain-of-custody documentation, and packaging and transportation of samples to the laboratory or shipping center. The samplers collect all samples, including replicates/duplicates, and prepare all sample blanks according to the SAP and corresponding standard procedures and work packages.

The Field Team Lead, samplers, and others responsible for implementation of this SAP and QAPjP will be provided with current copies of this document and any revisions thereto by the Waste Site Remediation Task Lead.

A2.1.1.9 Radiological Engineering Lead

The Radiological Engineering Lead is responsible for the radiological engineering and health physics support to the project. Specific responsibilities include conducting as-low-as-reasonably-achievable (ALARA) reviews, exposure and release modeling, and radiological controls optimization for all work planning. In addition, radiological hazards are identified and appropriate controls are implemented to maintain worker exposures to the hazards ALARA. The Radiological Engineering Lead interfaces with the project Health and Safety representative and plans and directs radiological control technician support for all activities.

A2.1.1.10 Sample and Data Management

The Sample and Data Management organization selects the laboratories that perform the analyses. This organization also ensures that the laboratories conform to Hanford Site internal laboratory QA requirements, or their equivalent, as approved by RL, EPA, and Ecology. Sample and Data Management receives the analytical data from the laboratories, makes the data entry into the *Hanford Environmental Information System* database (HEIS), and arranges for data validation. Validation will be performed on completed data packages by Project Hanford Management Contractor personnel or by an independent contractor qualified to perform validation by meeting the requirements of applicable Site procedures.

A2.1.1.11 Health and Safety Representative

Responsibilities include coordination of industrial health and safety support to the project as carried out through health and safety plans, activity job hazard analyses, and other pertinent safety documents required by Federal regulation or by internal Project Hanford Management Contractor work requirements. In addition, assistance is provided to project personnel in complying with applicable health and safety standards and requirements. Personal protective clothing requirements are coordinated with Radiological Engineering.

A2.1.2 Problem Definition/Background

The problem being addressed by this SAP is the need for investigation data for the 200-SW-2 OU landfills. These data will augment existing RI data compiled during Phase I-A characterization activities, leading to future phases of characterization, and ultimately completion of the RI/FS process for the 200-SW-2 OU landfills addressed in the RI/FS work plan.

Additional details on the problem definition and background are provided in Chapter 1.0 of the RI/FS work plan.

A2.1.3 Project/Task Description

Because of the complexity of the 200-SW-2 OU landfills, a phased characterization approach will be employed to aid in remedial action decision making. A preliminary investigation began in 2004 to perform a comprehensive review of existing documentation associated with the 200-SW-1 and 200-SW-2 OU waste sites. A large quantity of records was compiled and reviewed, and a database was created to capture information that could be used to focus future field characterization activities. In 2005, a collaborative negotiations process was held with the Tri-Parties (DOE, EPA, and Ecology). This process re-scoped the focus of the DQO to follow. The focus was changed to 22 waste sites in the 200-SW-2 OU. These waste sites were the original Bin 3A and Bin 3B sites and consisted of 21 landfills and one unplanned release. This DQO process (Phase I-A) focused on nonintrusive investigations of these waste sites, including geophysical, radiological, and organic vapor surveys.

After Phase I-A field characterization activities were performed in mid-2006, a Phase I-B DQO process was performed to support development of this RI/FS work plan. The Phase I-B DQO process focused on 24 landfills in the 200-SW-2 OU. An additional two landfills in the 200-SW-1 OU were included in the DQO, as well as this RI/FS work plan; however, it is proposed that these landfills be closed outside of the CERCLA process. They are included in this documentation for informational purposes only. A proposed regulatory path forward for closure of these landfills is presented in Chapter 5.0 of the RI/FS work plan. The Phase I-B DQO and this SAP focuses on additional nonintrusive characterization, as well as intrusive characterization techniques. Additional DQO processes will be held following completion of the Phase I-B field characterization activities, as required. These potential future phase DQO processes will further aid in characterizing the landfills and will focus on progressively more intrusive characterization techniques, as required. Information gathered from all phases will be used to support risk assessments, further refinement of the preliminary conceptual contaminant distribution models, and ultimately choosing a remedial action alternative.

The overall 200-SW-1 and 200-SW-2 OUs project description is to complete the RI/FS process and RCRA closure process for the 24 landfills in the 200-SW-2 OU, as well as closure of the landfills in the 200-SW-1 OU using the RCRA closure process for the Nonradioactive Dangerous Waste Landfill and the closure requirements in WAC 173-304, "Minimum Functional Standards for Solid Waste Handling") for closure of solid waste landfills for the 600 Area Central Landfill. As identified in this RI/FS work plan, Chapter 4.0, a combination of intrusive data-collection techniques, such as direct-pushes, will be used to collect geophysical logging data. Nonintrusive activities, such as surface geophysical surveys, existing well logging, passive soil vapor surveys, and remote visual and radiological surveys of potentially empty caissons, will be used to augment and focus intrusive data collection activities in future phases of characterization.

This SAP lays out the plan to complete data-collection activities for Phase I-B characterization. The data will be incorporated into an RI report to support Tri-Party Agreement major Milestone M-015-00C for completion of the RI/FS processes for the Central Plateau OUs by December 31, 2011. Chapter 6.0 of the RI/FS work plan provides a schedule of the interim milestones for the OUs leading to the major milestone.

A2.1.4 Quality Objectives and Criteria for Measurement Data

The QA objective of this plan is to develop implementation guidance to data-collection activities that will provide data of known and appropriate quality. Data quality is assessed by data quality indicators, by evaluation against identified DQOs, and by evaluation against the work activities identified in the existing work plans, and this RI/FS work plan and SAP. The applicable quality control (QC) guidelines and quantitative target limits for assessing data quality are dictated by the intended use of the data and the nature of the analytical method. Table A2-1 identifies the COPCs. Normally, the COPCs and their respective preliminary action levels would be identified in support of establishing analytical requirements, including analytical method target limits, however, because of the nature of the sampling techniques being performed in Phase I-B, preliminary action levels are not included in this SAP. Analytical performance requirements for the passive soil vapor surveys are included in Table A2-2, because these samplers are the only media to be sent to an analytical laboratory under this SAP. All other characterization techniques presented in this SAP are essentially field screening/logging techniques. The quantitative and qualitative data quality indicators also are described below.

Table A2-1. List of Contaminants of Potential Concern.

Chemical Constituents – Volatile Organics	
1,1-dichloroethane (DCA)	Carbon Tetrachloride
1,1-dichloroethene	Chlorobenzene
1,1,1-trichloroethane (TCA)	Chloroform
1,1,2-trichloroethane	Cis-1,2-dichloroethylene
1,1,2,2-tetrachloroethane	Dichloromethane (methylene chloride)
1,2-dichlorobenzene	Ethylbenzene
1,2-dichloroethane (DCA)	Naphthalene
1,3-dichlorobenzene	n-butyl Benzene
2,4-dinitrotoluene	Tetrachloroethylene (PCE)
2-butanone (methyl ethyl ketone/MEK)	Toluene
2-hexanone (methyl isobutyl ketone (MIBK)	Trans-1,2-dichloroethylene
2-methylphenol (o-cresol)	Trichloroethylene (TCE)
4-methylphenol (p-cresol)	Xylene
Benzene	Butanol

Table A2-2. Analytical Performance Requirements.

Analytical Parameter	Collection Device & Method	Target Detection Limit	Accuracy (%)	Precision (%)
Laboratory Analysis				
Organic vapors (VOCs per manufacturers' specifications)	Passive soil-gas (EMFLUX or GORE-SORBER),[a] EPA Method 8260B[b]	10 ng/sample	+/-25	70 – 130

[a]EMFLUX is a registered trademark of Beacon Environmental Services, Inc., Bel Air, Maryland. GORE-SORBER is a trademark of W. L. Gore and Associates, San Francisco, California.
[b]EPA Method 8260B (utilizes gas chromatography/ mass spectrometry) is found in SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update III-A.*
EPA = U.S. Environmental Protection Agency.
ng = nanogram.
VOC = volatile organic compound.

A2.1.4.1 Development of Contaminants of Potential Concern and Preliminary Action Levels for Establishment of Analytical Requirements

This section identifies the 200-SW-2 OU COPCs and identifies the process for development of their corresponding preliminary action levels in support of establishing appropriate analytical requirements. The analytical performance requirements for the passive soil vapor surveys, including target detection limits, are contained in Table A2-2.

A2.1.4.1.1 Development of Contaminants of Potential Concern

The 200 Areas have been the center of activity for processing plutonium at the Hanford Site since the mid-1940s. There are five general plant process groupings: (1) fuel processing, (2) plutonium isolation, (3) uranium recovery, (4) cesium/strontium recovery, and (5) waste storage/treatment. All of these plant processes generated solid waste that was disposed of in the 200-SW-2 OU waste sites. In addition, the 200-SW-2 OU waste sites contain solid waste generated in the 100 and 300 Areas of the Hanford Site and at other, non-Hanford facilities.

The set of organic COPCs that are likely to be present in the 200-SW-2 OU waste sites are based on the 200 Areas plant operations, as identified in various DQO documents for the 200 Areas OUs, including the 200-CW-1, 200-CS-1, 200-CW-5, 200-LW-1, 200-LW-2, 200-MW-1, 200-PW-1, 200-PW-2, 200-PW-4, 200-TW-1, and 200-TW-2 OUs. In general, the majority of the waste disposed to the 200-SW-2 OU waste sites consists of solid wastes in the form of construction and building debris; maintenance wastes; process equipment, materials, and wastes; and limited amounts of liquid wastes, generally stabilized.

The original COPC list was screened, via the Phase I-B DQO process, to eliminate contaminants that are not readily detectable via nonintrusive survey techniques. Nevertheless, these COPCs for the 200-SW-2 OU will be preserved and carried forward into the Phase II DQO process for further evaluation for applicability in future phase sampling. The COPC list for the nonintrusive passive organic vapor sampling described in this SAP is presented in Table A2-1.

A2.1.4.1.2 Development of Preliminary Action Levels

Preliminary action levels represent regulatory- or risk-based soil concentrations of nonradionuclide or radioactive constituents that are considered protective of human health, ecological receptors, and groundwater and could be used by the RI/FS process to meet remedial action objectives. Identification of preliminary action levels is not included in this SAP, because this SAP focuses on reconnaissance-level characterization techniques. These action levels will be developed during revision of this SAP, following the Phase I-B DQO process.

A2.1.4.2 Quantitative Analytical Parameters

The quantitative analytical parameters of precision and accuracy as described in the following sections will apply to analytical data analysis.

A2.1.4.2.1 Accuracy

Accuracy is an assessment of the closeness of the measured value to the true value. Accuracy of chemical test results is assessed through several standard methods. These methods include calibrating measurement systems using standards of known concentration (calibration); analyzing solutions known to contain no analytes of interest to verify that the sample processing and preparation process do not affect the measurement (blank analyses); routinely analyzing samples containing known concentrations of analyte(s) of interest (laboratory control sample analysis); and, spiking samples with known standards and establishing the average recovery (matrix spike analysis). Validity of calibrations is evaluated by comparing results from the measurement of a standard to known values and/or by generating in-house statistical limits based on three standard deviations (+/- 3 SD). Table A2-2 list the accuracy requirements for fixed laboratory analyses for the passive soil vapor surveys.

An additional element of the accuracy objective is measurement method sensitivity, frequently described by the minimum detectable concentration, also referred to as the detection limit. The detection limit reflects the smallest concentration of an analyte that can be reliably measured in a sample and must be established to provide data at concentrations low enough for comparison against remedial action levels and remediation goals established during the RI/FS planning process. Detection limits are functions of the analytical method used to provide the data and the quantity of the sample available for analyses. Detection limits identified for the analytes for the passive soil vapor surveys are listed in Table A2-2 (see Target Detection Limit column in the table). The preliminary action levels are estimates of potential cleanup levels and are used in this SAP to ensure that detection limits are established to provide laboratory data at low enough concentrations to assess potential action limits during the feasibility study, where potential applicable or relevant and appropriate requirements are identified. Required detection limits generally are lower than the preliminary action levels so that any nondetect laboratory results can be used to demonstrate that the field concentrations do not, in fact, exceed target action levels. The detection limits presented in the tables are typical for clean media and trace-level analysis and should be achievable by a laboratory in the absence of interferences. A laboratory analyzing samples displaying more than trace level contamination may not be able to achieve these detection limits.

The general objective for detection limits is to establish a minimum detectable concentration that is below the action level to prevent generation of inconclusive data. However, because the passive soil vapor surveys are being used as a general indicator of the presence of organic vapors in the soil, preliminary action levels will not be established in this SAP.

The accuracy of radiation detection instrumentation planned for use during execution of this SAP (i.e., spectral gamma) is +/- 20% with a target detection limit of 1 pCi/g (based on Cs-137 concentration in surface soil).

Geophysical methods planned for use in executing this SAP (i.e., ground-penetrating radar [GPR], electromagnetic induction [EMI], total magnetic field [TMF]) record accurate and precise quantitative measurements when used in accordance with manufacturer's recommendations and procedures. However, subjective interpretations of data by properly qualified and trained professionals (i.e., geologists/geophysicists) are required. Accuracies within +/- 0.1% of full-scale measurements and +/- 1 m of actual location are typical.

A2.1.4.2.2 Precision

Precision is a measure of the data spread when more than one measurement has been taken on the same sample. Precision is assessed through analysis of multiple aliquots of the same sample in the laboratory (laboratory replicate analysis), through analysis of split samples prepared in the field and submitted to the laboratory as separate samples (field duplicate analysis), and through assessment of multiple analyses of laboratory control samples. Precision typically is expressed as the relative percent difference for duplicate measurements. Analytical precision requirements for passive soil vapor surveys are listed in Table A2-2. These are typical precision levels that a laboratory should be able to achieve on project samples. Inability to achieve the precision requirements is an indicator that there is a problem with the sampling process, analytical system, or sample matrix and requires further investigation.

The precision of radiation detection instrumentation planned for use during execution of this SAP is 10 percent. The precision of geophysical methods planned for use in executing this SAP, like accuracy, is good when instrument operation is in accordance with manufacturer's recommendations and procedures.

A2.1.4.2.3 Completeness

Completeness is a measure of the amount of valid data needed to be obtained from a measurement system. This parameter compares the number of valid measurements completed to the minimum number of samples to be collected and analyzed to establish description/ measurement of the system at a minimum confidence with those established by the project's quality criteria (DQOs or performance/acceptance criteria).

For this RI activity, the overall objective for completeness will not be established, because the techniques used for characterization in this phase are reconnaissance-level surveys that will be used to focus future phase intrusive characterization activities.

A2.1.4.3 Qualitative Analytical Parameters

Qualitative analytical parameters identified in this section include representativeness and comparability. These parameters are described below.

A2.1.4.3.1 Representativeness

Representativeness refers to the degree to which a data set actually describes a sample of a population (e.g., the information presented by the data set can be extrapolated to describe the overall site or system). The measurements of a data set must be evaluated to determine whether the data are collected in such a manner that they represent the environment or condition being measured or studied (i.e., the actual concentration and distribution of the radiological constituents in the matrix sampled). Representativeness should be assessed on a gross (i.e., site or system) level and on an individual measurement level to ensure that the data user understands how the data set can be used to describe the target system. Sampling plan design, sampling techniques, and sample handling protocols (e.g., storage, preservation, transportation) have been developed and are discussed in subsequent sections of this document. Representativeness of the data set will be evaluated during the data quality assessment (DQA). The DQA process is described in Section A2.4.3.

A2.1.4.3.2 Comparability

Comparability is an expressed measure of confidence that one data set can be compared to previous and subsequent measurements and so can be combined for purposes of decision making. This parameter compares sample collection and handling methods, sample preparation and analytical procedures, holding times, stability issues, and QA protocols. Data comparability will be maintained using standard procedures, consistent methods, and consistent units. Table A2-2 lists applicable fixed-laboratory methods for analytes and target detection limits.

A2.1.5 Special Training/Certification Requirements

A graded approach is used to ensure that workers receive a level of training that is commensurate with their responsibilities and that complies with applicable DOE orders and government regulations. The Field Team Lead, in coordination with line management, ensures that all field personnel meet all special training requirements.

Typical training requirements or qualifications have been instituted by the primary contractor management team to meet training requirements imposed by the Project Hanford Management Contract (DE-AC06-96RL13200, *Contract Between the U.S. Department of Energy, Richland Operations Office, and Fluor Hanford, Inc.*), regulations, DOE orders, DOE contractor requirements documents, American National Standards Institute/American Society of Mechanical Engineers, *Washington Administrative Code*, etc. For example, the environmental, safety, and health training program provides workers with the knowledge and skills necessary to safely execute assigned duties.

Field personnel typically will have completed the following training before starting work:

- Occupational Safety and Health Administration 40-hour hazardous waste worker training and supervised 24-hour hazardous waste-site experience
- 8-hour hazardous waste worker refresher training (as required)
- Hanford General Employee Training (HGET)
- Radiological worker training.

Project specific training includes the following.

- Training requirements or qualifications needed by sampling personnel will be in accordance with QA requirements.
- Training requirements or qualifications required by sampling personnel will be in the statements of work for subcontracted services.
  - Project personnel deploying passive soil-gas sampling devices will receive training in accordance with manufacturer's recommendations and procedures for proper use of the equipment. At a minimum, procedures for equipment use will be "required reading" with documentation of completion in project files.
  - Geophysical methods (GPR, EMI, TMF, borehole logging) will be subcontracted work. Subcontractors will be required to operate equipment in accordance with manufacturer's recommendations and procedures, using or under the supervision of properly trained and qualified geologists or geophysicists. Documentation of training, qualifications, or other certifications will be maintained in the project files.
  - Direct-push activities will be subcontracted work. Subcontractors will be required to operate equipment in accordance with manufacturer's recommendations and procedures using properly trained and qualified personnel. Documentation of training, qualifications, or other certifications will be maintained in the project file.
- Qualification requirements for radiological control technicians are established by the Radiation Protection Program; radiological control technicians assigned to these activities will be qualified through the prescribed training program and will undergo ongoing training and qualification activities.

Project-specific safety training, geared specifically to the project and the day's activity, will be provided. Pre-job briefings will be performed to evaluate an activity and its hazards by considering many factors including the following:

- Objective of the activities
- Individual tasks to be performed
- Hazards associated with the planned tasks
- Controls applied to mitigate the hazards

- The environment in which the job will be performed
- The facility where the job will be performed
- The equipment and material required
- Review of Materials Safety Data Sheets, as applicable
- The safety procedures applicable to the job
- The training requirements for individuals assigned to perform the work
- The level of management control
- The proximity of emergency contacts.

Training records are recorded for each individual in an electronic training record database. The Fluor Hanford training organization maintains the training records system. Line management will confirm that an individual employee's training is appropriate and up-to-date before performing any fieldwork.

A2.1.6 Documentation and Records

The Waste Site Remediation Task Lead is responsible for ensuring that the current version of the SAP is being used and for providing any updates to field personnel. Version control is maintained by the administrative document control process. Minor changes to the FSP, such as sample location changes, may be made in the field by the Waste Site Remediation Field Project Manager and Task Lead. Significant changes to the FSP that affect the DQOs will be reviewed and approved by RL and Ecology before implementation; this approval may be through actual revision of this RI/FS work plan and/or SAP documents or may be documented through Unit Manager Meeting minutes under the Tri-Party Agreement. Performance of additional field activities (collection of more samples or additional locations) based on the results of the field activities will not require approval. The Waste Site Remediation Task Lead and Field Project Manager are responsible for ensuring that the field instructions are maintained up to date and aligned with any revisions to the SAP. As appropriate, the document revision process will follow the requirements set forth in Section 9.3 of the *Hanford Federal Facility Agreement and Consent Order Action Plan* (Ecology et al., 1989b).

The project file will include the following, as appropriate:

- Field logbooks or operational records
- Global Positioning System data
- Chain-of-custody forms
- Sample receipt records
- Inspection or assessment reports and corrective action reports
- Interim progress reports
- Final reports.

The Waste Site Remediation Task Lead is responsible for ensuring that the data file is properly maintained. The project files will contain the records or references to their storage locations.

The laboratory is responsible for maintaining and having available upon request:

- Analytical logbooks
- Raw data and QC sample records
- Standard reference material and/or proficiency test sample data
- Instrument calibration information.

Records may be stored in either electronic or hard copy format. Documentation and records, regardless of medium or format, are controlled in accordance with internal work requirements and processes that ensure accuracy and retrievability of stored records. Records required by the Tri-Party Agreement will be managed in accordance with the requirements of the Agreement.

A2.2 MEASUREMENT/DATA ACQUISITION

This section presents the requirements for sampling methods, sample handling and custody, analytical methods, and field and laboratory QC. Instrument calibration, maintenance supply inspection, and data management requirements also are addressed.

A2.2.1 Sampling Process Design

The sampling process design describes the data-collection design for the project, including types and numbers of samples required, sampling locations and frequency, sample matrices, and the rationale for the design. The sample design focuses on the following:

- Further investigation of areas showing elevated levels of organic vapors detected during Phase I-A characterization activities
- Investigation using passive organic vapor surveys of areas showing a strong metallic signature detected during Phase I-A geophysical surveys
- Investigation of remaining landfills using surface geophysical techniques (13 of the 24 landfills were surveyed during Phase I-A activities)
- Radiological and remote visual inspection of caissons that are believed to be empty/unused to verify the absence of waste
- Visual inspections and potential geophysical surveys of unused areas of TSD unit landfills to support administrative closure of these areas
- Direct-pushes into landfills (between trenches) to determine stratigraphy, moisture content, and radiological conditions
- Logging (i.e., moisture, radiological, geophysical) of existing monitoring wells near the 200-SW-2 OU landfills.

This SAP is aimed at collecting data to focus future intrusive characterization, provide a better understanding of the geology beneath the landfills, refine the preliminary conceptual

contaminant distribution models, and ultimately support the RI/FS process. Therefore, the sampling design for activities conducted under this SAP is mainly a focused (or judgmental) strategy aimed at targeted locations. The focused sampling is a result of having existing historical knowledge of contaminants from site-specific information. These data include construction information, burial records, contaminant inventories, information from similar sites, geophysical logging within or near sites, passive soil vapor surveys, and/or surface geophysical surveys (additional details on sampling are provided in Section A3.1).

Additional sampling is anticipated following the record of decision to collect confirmatory, design, and verification samples at sites as needed. Post-record of decision sampling needs will be identified through a series of DQO processes as described in Chapter 5.0 of the RI/FS work plan.

A2.2.2 Sampling Methods

This SAP provides information on a variety of nonintrusive sampling methods that may be used during Phase I-B characterization. Data-collection methods include passive soil vapor surveys, direct-push geophysical logging, surface geophysical surveys, radiological screening, and other methods as warranted by the data needs. Nonintrusive data-collection techniques will be used to augment the existing data and to focus future phase intrusive characterization activities. The resulting data will aid in evaluating the nature and extent of contamination during the RI/FS process. Details of sample and data-collection methods included in this SAP are provided in Section A3.1.

A2.2.2.1 Decontamination of Sampling Equipment

To prevent contamination of the samples, care should be taken to use clean equipment for each sampling activity. In general, disposable sampling equipment will be used where appropriate.

Special care should be taken to avoid the following common ways in which cross-contamination or background contamination may compromise the samples:

- Improperly storing or transporting sampling equipment and sample containers
- Contaminating the equipment or sample bottles by setting the equipment/sample bottle on or near potential contamination sources (e.g., uncovered ground)
- Handling bottles or equipment with dirty hands or gloves
- Improperly decontaminating equipment before sampling or between sampling events.

A2.2.3 Sample Handling and Custody Requirements

All field-sample handling, shipping, and custody requirements will be consistent with established procedures. The radiological control technician will measure the contamination levels and dose rates associated with the sample containers. This information, along with other data, will be used

to select proper packaging, marking, labeling, and shipping paperwork and to verify that the sample can be received by the analytical laboratory in accordance with the laboratory's acceptance criteria. Preliminary container types and volumes are identified in Table A2-3. The final types and volumes will be indicated on the Sampling Authorization Form prepared by Sample and Data Management; however, field changes can be made if necessary. Field-determined radiological properties of the sample also may affect the container size. Each sample container will be labeled with the following information, using a waterproof marker on firmly affixed, water-resistant labels:

- Sampling Authorization Form
- HEIS number
- Sample collection date/time
- Name of person collecting the sample
- Analysis required
- Preservation method (if applicable).

Table A2-3. Vapor Sample Preservation, Container, and Holding Time Guidelines for Field Screening.

Analytes	Analytical Priority	Matrix	EMFLUX or GORE-SORBER Sampler*		Preservation	Packing Requirements	Holding Time
			Number	Volume			
Volatile Organic Compounds							
Volatile organic compounds	1	Vapor	293 (see Tables A3-1 and A3-2 for coordinates)	As prescribed by the manufacturer	Ambient temperature, at or near atmospheric pressure	N/A	14-28 days

*EMFLUX is a registered trademark of Beacon Environmental Services, Inc., Bel Air, Maryland. GORE-SORBER is a trademark of W. L. Gore and Associates, San Francisco, California.
N/A = not applicable.

Sample transportation will be in compliance with the applicable regulations for packaging, marking, labeling, and shipping hazardous materials, hazardous substances, and hazardous waste that are mandated by the U.S. Department of Transportation (49 CFR 171-177, "Transportation," Chapter 1, "Research and Special Programs Administration, Department of Transportation," Part 171, "General Information, Regulations, and Definitions," through Part 177, "Carriage By Public Highway") in association with the International Air Transportation Authority, DOE requirements, and applicable program-specific implementing procedures.

Sample custody during laboratory analysis is addressed in the applicable laboratory standard operating procedures. Laboratory custody procedures will ensure that sample integrity and identification are maintained throughout the analytical process. Storage of samples at the laboratory will be consistent with laboratory instructions prepared by Sample and Data Management.

The Fluor Hanford *Sample Data Tracking* database will be used to track the samples from the point of collection to through the laboratory analysis process. The HEIS database is the repository for the laboratory analytical results. The HEIS sample numbers will be issued to the

sampling organization for the project. Each radiological, nonradiological, and physical properties sample will be identified and labeled with a unique HEIS sample number. The sample location, depth, and corresponding HEIS numbers will be documented in the sampler's field logbook. All field-sample handling, shipping, and custody requirements will be consistent with established procedures.

A2.2.3.1 Sample Preservation, Containers, and Holding Times

Sample preservation, container, and holding-time requirements will be indicated on Chain of Custody/Sample Analysis Request forms in accordance with internal work processes and requirements and the specific analytical method prepared for specific sample events. The sample preservation, container, and holding time requirements for the analyses to be performed are summarized in Table A2-3.

A2.2.4 Analytical Methods Requirements

Analytical parameters and methods are listed in Table A2-2. These analytical methods are implemented in accordance with the laboratory's QA plan and the requirements of this QAPjP. The Project Hanford Management Contractor conducts oversight of offsite analytical laboratories to qualify them for performing Hanford Site analytical work. This section only applies to the analysis of passive organic vapor samplers, because these are the only sample media to be analyzed at a laboratory under Phase I-B.

Deviations from the analytical methods noted in Table A2-2 must be approved by the Waste Site Remediation Task Lead. If the laboratory uses a nonstandard or unapproved method, the laboratory must provide method validation data to confirm that the method is adequate for the intended use of the data. This includes information such as determination of detection limits, quantitation limits, typical recoveries, and analytical precision and bias.

Laboratories providing analytical services in support of this SAP will have in place a corrective action program that addresses analytical system failures and documents the effectiveness of any corrective actions. Errors reported by the laboratories are reported to the Sample and Data Management Project Coordinator, who is responsible to document analytical errors and to establish the resolution in coordination with the Waste Site Remediation Task Lead.

Communications with the laboratory will be managed by the Sample and Data Management organization. Sample and Data Management will be responsible for communicating status, issues, corrective actions, and other pertinent laboratory information to the Waste Site Remediation Task Lead and the Waste Site Remediation Manager.

A2.2.5 Quality Control Requirements

The QC procedures must be followed in the field and laboratory to ensure that reliable data are obtained. Field QC samples will be collected to evaluate the potential for cross-contamination and to provide information pertinent to field variability. Field QC for sampling will require the collection of field replicates (duplicates), trip or field blanks, and equipment blanks. Laboratory

QC samples estimate the precision and bias of the analytical data. QC sampling is described here in general terms; actual QC samples and the required frequency for collection are described in the following sections.

The collection of QC samples for onsite measurements is only applicable to passive organic vapor sampling. Field-screening instrumentation (i.e., radiological instrumentation, logging equipment) will be calibrated and controlled as discussed in Sections A2.2.6 and A2.2.7, as applicable.

The laboratory method blanks, laboratory control sample/blank spike, and matrix spike are defined in Chapter 1 of SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, Third Edition; Final Update III-B*, and will be run at the frequency specified in that reference.

To ensure sample and data usability, the sampling associated with this SAP will be performed in accordance with established sampling practices, procedures, and requirements pertaining to sample collection, collection equipment, and sample handling. The Field Team Lead and the Waste Site Remediation Task Lead are responsible for ensuring that all field procedures are followed completely and that field-sampling personnel are adequately trained to perform sampling activities under this SAP. The Waste Site Remediation Lead, or the Field Team Lead at the discretion of the Waste Site Remediation Task Lead, must document all deviations from procedures or other problems pertaining to sample collection, chain of custody, COPCs, sample transport, or noncompliant monitoring. As appropriate, such deviations or problems will be documented in the field logbook or on nonconformance report forms in accordance with internal corrective-action procedures. The Waste Site Remediation Lead, or the Field Team Lead at the discretion of the Waste Site Remediation Task Lead, will be responsible for communicating field corrective-action requirements and for ensuring that immediate corrective actions are applied to field activities.

A2.2.5.1 Field Duplicates

Field duplicates are independent samples collected as close as possible to the same point in space and time, taken from the same source, stored in separate containers, and analyzed independently.

Field duplicates normally are collected from a minimum frequency of 5 percent of the total collected samples, or a minimum of one field duplicate for each landfill. The duplicate samples will be sent to the primary laboratory in the same manner that the routine site samples are sent. The field duplicates will be analyzed for all of the analytes listed in Table A2-1.

A2.2.5.2 Field Splits

Field splits of passive soil vapor samples are not considered necessary to be collected under this SAP.

A2.2.5.3 Equipment Rinsate Blanks

The use of equipment rinsate blanks is not applicable under this SAP.

A2.2.5.4 Field Blanks

Field blanks for passive soil vapor samples are not applicable to be collected under this SAP.

A2.2.5.5 Field Duplicates

For soil-vapor samples collected in EMFLUX[1] or GORE-SORBER[2] samplers, duplicates are defined as independent samples collected as close as possible to the same point in space and time, taken from the same source, stored in separate containers, and analyzed independently (i.e., not homogenized). A minimum of one duplicate sample will be collected during soil-vapor sampling of each landfill.

A2.2.6 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

Measurement and testing equipment used in the field or in the laboratory that directly affects the quality of analytical data will be subject to preventive maintenance measures to ensure minimization of measurement system downtime. Laboratories and onsite measurement organizations must maintain and calibrate their equipment. Maintenance requirements (such as parts lists and documentation of routine maintenance) will be included in the individual laboratory and the onsite organization QA plan or operating procedures (as appropriate). Calibration of laboratory instruments will be performed in a manner consistent with SW-846 or with auditable DOE Hanford Site and contractual requirements. Consumables, supplies, and reagents will be reviewed in accordance with SW-846 requirements and will be appropriate for their use.

A2.2.7 Instrument Calibration and Frequency

All onsite environmental instruments are calibrated in accordance with the manufacturer's operating instructions, internal work requirements and processes, and/or work packages that provide direction for equipment calibration or verification of accuracy by analytical methods. The results from all instrument calibration activities are recorded in logbooks and/or work packages.

Field instrumentation, calibration, and QA checks will be performed in accordance with the following.

- Calibration of radiological field instruments on the Hanford Site is performed under contract by Pacific Northwest National Laboratory, as specified in their program documentation.

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[1] EMFLUX is a registered trademark of BEACON Environmental Services, Inc., Bel Air, Maryland.

[2] GORE-SORBER is a registered trademark of W. L. Gore and Associates, San Francisco, California.

- Daily calibration checks will be performed and documented for each instrument used to characterize areas that are under investigation. These checks will be made on standard materials that are sufficiently like the matrix under consideration that direct comparison of data can be made. Analysis times will be sufficient to establish detection efficiency and resolution.

Analytical laboratory instruments and measuring equipment are calibrated in accordance with the laboratories' QA plan.

Calibration is conducted with equipment or standards with known valid relationships to nationally recognized performance standards. Field equipment used in this data-collection activity that requires calibration will be listed in the fieldwork package. Such equipment is uniquely identified and calibrated in accordance with the equipment-specific calibration procedure, including the program for maintaining calibration records traceable to the uniquely identified piece of equipment. The results from all instrument calibration activities are recorded in logbooks and/or work packages.

A2.2.8 Inspection/Acceptance Requirements for Supplies and Consumables

Supplies and consumables procured by Fluor Hanford that are used in support of sampling and analysis activities are procured in accordance with internal work requirements and processes that describe the Project Hanford Management Contractor acquisition system. The procurement process ensures that purchased items and services comply with applicable procurement specifications, thereby ensuring that structures, systems, and components, or other items and services procured/acquired for Fluor Hanford, meet the specific technical and quality requirements. Supplies and consumables are appropriately issued to the field and then checked and accepted before use.

Supplies and consumables procured by the analytical laboratories are procured, checked, and used in accordance with their QA plans.

A2.2.9 Data Acquisition Requirements for Nondirect Measurements

Nondirect measurements include data obtained from sources such as computer databases, programs, literature files, and historical databases. Nondirect measurements (e.g., historical records and reports) were used extensively in identification of data needs and DQOs for this RI. Nondirect measurements are not planned to be acquired as a portion of the data-collection activity under this SAP. However, any incidental nondirect measurement used as data acquired during this SAP activity (e.g., weather data from other sources) and used in decision making will be documented.

A2.2.10 Data Management

Analytical data resulting from the implementation of this QAPjP will be managed and stored in accordance with the applicable programmatic requirements governing data management procedures, as well as with SGW-35016, *Information and Data Management Plan for the 200-SW-2 Operable Unit*. Electronic data access, when appropriate, will be via a database (e.g., HEIS or a project-specific database). Where electronic data are not available, hard copies will be provided in accordance with Section 9.6 of the Tri-Party Agreement (Ecology et al., 1989a).

Planning for sample collection and analysis will be in accordance with the programmatic requirements governing fixed-laboratory sample collection activities, as discussed in the sample team's procedures. In the event that specific procedures do not exist for a particular work evolution, or it is determined that additional guidance to complete certain tasks is needed, a work package will be developed to adequately control the activities, as appropriate. Examples of the sample team's requirements include activities associated with the following:

- Chain of custody/sample analysis requests
- Project and sample identification for sampling services
- Control of certificates of analysis
- Logbooks and checklists
- Sample packaging and shipping.

Approved work control packages and procedures will be used to document field activities, including radiological measurements, when this SAP is implemented. All field activities will be recorded in field logbooks or appropriate forms invoked by procedure. Examples of the types of documentation for field radiological data include the following:

- Instructions regarding the minimum requirements for documenting radiological controls information in accordance with 10 CFR 835, "Occupational Radiation Protection"
- Instructions for managing the identification, creation, review, approval, storage, transfer, and retrieval of primary contractor radiological records
- The minimum standards and practices necessary for preparing, performing, and retaining radiological-related records
- The indoctrination of personnel on the development and implementation of sample plans
- The requirements associated with preparing and transporting regulated material
- Daily reports of radiological surveys and measurements collected during conduct of field investigation activities. Data will be cross-referenced between laboratory analytical data and radiation measurements to facilitate interpreting the investigation results.

Errors are reported to the Fluor Hanford Office of Sample and Data Management on a routine basis. Laboratory errors are reported to the Sample Management Project Coordinator, who initiates a Sample Disposition Record in accordance with Project Hanford Management Contractor procedures. This process is used to document analytical errors and to establish their

resolution with the Waste Site Remediation Task Lead. The Sample Management Project Coordinator provides the Sample Disposition Record to the Task Lead for review and signature. The Sample Disposition Records become a permanent part of the analytical data package for future reference and for records management.

A2.3 ASSESSMENT/OVERSIGHT

This section identifies the activities for assessing project and associated QA and QC activities for compliance with QAPjP requirements.

A2.3.1 Assessments and Response Actions

The Project Hanford Management Contractor management, regulatory compliance, quality, and/or health and safety organizations may conduct random surveillances and assessments to verify compliance with the requirements outlined in this SAP, project work packages, the project quality management plan, procedures, and regulatory requirements. Project-specific management assessments will be conducted on an annual basis for activities conducted under this RI/FS work plan and SAP. Field supervision will also perform assessments via documented pre-job readiness meetings, and routine oversight of field activities. Other assessments may be conducted on a random or as-needed basis. Data obtained under this SAP will undergo DQA in accordance with Section A2.4.3. No validation will be performed for radiological survey data or geophysical survey data. Although no validation will be performed for radiological and geophysical survey data, the surveys will be conducted by trained personnel, in accordance with approved procedures, using properly calibrated equipment.

If circumstances should arise in the field that would dictate the need for additional assessment activities, these activities would be performed and recorded in accordance with approved procedures. Deficiencies identified by these assessments will be reported in accordance with existing programmatic requirements. The project's line management chain coordinates the corrective actions/deficiencies in accordance with the Project Hanford Management Contractor Quality Assurance Program, the Corrective Management Action Program, and associated approved procedures that implement these programs.

Oversight activities in the analytical laboratories, including corrective action management, are conducted in accordance with the laboratories' QA plans. To ensure that laboratory QA requirements are met, Project Hanford Management Contractor personnel conduct periodic oversight activities for offsite analytical laboratories in accordance with Hanford Site QA program requirements to qualify them for performing Hanford Site analytical work.

A2.3.2 Reports to Management

Reports to management on data quality issues will be made if and when these issues are identified by self-assessments or other types of assessments. Errors reported by the laboratories are communicated to the Field Team Lead, who initiates a sample disposition record in

accordance with primary contractor procedures. This process is used to document analytical errors and to establish resolution with the Waste Site Remediation Task Lead.

DQA reports will be prepared to evaluate whether the type, quality, and quantity of the data that were collected meet the quality objectives described in the DQO.

A2.4 DATA VALIDATION AND USABILITY

Data validation and usability activities occur after the data-collection phase of the project is completed. Implementation of these elements determines whether the data conform to the specified criteria, thus satisfying the project objectives.

A2.4.1 Data Review, Validation, and Verification

Data will be reviewed, and data verification and validation will be performed on analytical data sets. Only the passive organic vapor samplers will result in analytical data. All other characterization activities involve qualitative reconnaissance-level surveys that will not require data verification and verification. These activities confirm that sampling and chain-of-custody documentation is complete and sample numbers can be tied to the specific sampling location described in Section A2.2, that samples were analyzed within required holding times identified in Table A2-3, and that sample analyses met the data quality requirements specified in this QAPjP.

Data verification will be performed on analytical data sets to ensure and document that the reported results reflect what was actually done. The criteria for verification include, but are not limited to, review for completeness (i.e., all samples were analyzed as requested), use of the correct analytical method/procedure, transcription errors, correct application of dilution factors, appropriate reporting of dry weight versus wet weight, and correct application of conversion factors. Laboratory personnel may perform data verification.

Data validation will be performed on analytical data sets to ensure that the data quality goals established during the planning phase have been achieved. As recommended in EPA guidance (Bleyler 1988a, *Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses*; Bleyler 1988b, *Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses*), the criteria for data validation are based on a graded approach. Fluor Hanford has defined five levels of validation, A – E. Level A is the lowest level and is the same as verification. Level E is a 100 percent review of all data (e.g., calibration data; calculations of representative samples from the dataset). Validation will be performed to Level C.

Level C validation includes a review of the QC data and specifically requires verification of deliverables and requested versus reported analyses and qualification of the results based on analytical holding times; method blank results; matrix spike/matrix spike duplicate; surrogate recoveries; duplicates; and analytical method blanks. Level C validation will be performed for up to 5 percent of the data by matrix and analyte group. Analyte group refers to categories, such as radionuclides, volatile chemicals, semivolatiles, polychlorinated biphenyls, metals, and anions. The goal is to cover the various analyte groups and matrices during the validation.

No validation of physical data and/or field-screening results will be performed. However, field QA/QC (Section A2.2) will be reviewed to ensure that the data are useable.

A2.4.2 Validation and Verification Methods

Validation activities will be based on EPA functional guidelines (Bleyler 1988a; Bleyler 1988b). Data validation may be performed by the analytical laboratory, Sample and Data Management, and/or by a party independent of both the data collector and the data user. Only the passive organic vapor samplers will result in analytical data. However, since the passive organic vapor sampling results are used primarily for screening purposes, validation and verification is not warranted. Validation and verification may be applicable for future/follow-on sampling. All other characterization activities involve qualitative reconnaissance-level surveys that will not require data verification and verification.

When outliers or questionable results are identified, additional data validation will be performed. The additional validation will be performed for up to 5 percent of the statistical outliers and/or questionable data. The additional validation will begin with Level C and may increase to Levels D and E as needed to ensure that the data are usable. Note that Level C validation is a review of the QC data, while Levels D and E include review of calibration data and calculations of representative samples from the dataset. Data validation will be documented in data validation reports, which will be provided to the Sample and Data Management organization and in the DQA report (see Section A2.4.3). The Sample and Data Management organization is responsible for distributing the data validation report to the Waste Site Remediation Task Lead and to others as necessary. The determination of data usability will be documented in the DQA.

A2.4.3 Reconciliation with User Requirements

Following data verification and validation, the data need to be evaluated to determine if they answer the original questions asked (e.g., DQOs). The DQA process compares completed field-sampling activities to those proposed in corresponding sampling documents and provides an evaluation of the resulting data. Only the passive organic vapor samplers will result in analytical data. All other characterization activities involve qualitative reconnaissance-level surveys that will not require data verification and verification. The purpose of the data evaluation is to determine if quantitative data are of the correct type and are of adequate quality and quantity to meet the project DQOs. The Waste Site Remediation Task Lead is responsible for ensuring that a DQA is performed. The results of the DQA will be reported to the Waste Site Remediation Task Lead and will be used in interpreting the data and determining if the objectives of this activity have been met.

The EPA DQA process, EPA/240/B-06/002, *Data Quality Assessment: A Reviewers Guide*, EPA QA/G-9R, and EPA/240/B-06/003, *Data Quality Assessment: Statistical Tools for Practitioners*, EPA QA/G-9S, identifies five steps for evaluating data generated from this project, as summarized below.

Step 1. Review DQOs and Sampling Design. This step requires a comprehensive review of the sampling and analytical requirements outlined in the project-specific DQO workbook and SAP.

Step 2. Conduct a Preliminary Data Review. In this step, a comparison is made between the actual QA/QC achieved (e.g., detection limits, precision, accuracy) and the requirements determined during the DQO. Any significant deviations will be documented. Basic statistics will be calculated from the analytical data at this point, as appropriate to the data set, including an evaluation of the distribution of the data and in accordance with the DQOs.

Step 3. Select the Statistical Test. Using the data evaluated in Step 2, an appropriate statistical hypothesis test is selected and justified.

Step 4. Verify the Assumptions. In this step, the validity of the data analyses is assessed by determining if the data support the underlying assumptions necessary for the analyses or if the data set must be modified (e.g., transposed, augmented with additional data) before further analysis. If one or more assumptions are questioned, Step 3 is repeated.

Step 5. Draw Conclusions from the Data. The statistical test is applied in this step, and the results either reject the null hypothesis or fail to reject the null hypothesis. If the latter is true, the data should be analyzed further. If the null hypothesis is rejected, the overall performance of the sampling design should be evaluated by forming a statistical power calculation to assess the adequacy of the sampling design.

A3.0 FIELD-SAMPLING PLAN

The FSP describes the field activities for collection of field observations, measurements, and samples for laboratory analysis. This FSP provides more detailed information on sampling methods, field-screening technologies, and waste management activities. All of the data-collection techniques may not be required at each landfill. Tables in this chapter provide the site-specific sample locations. Some locations in the 200-SW-2 OU landfills may not be accessible for sampling due to access restrictions (e.g., no-walk/no-drive zones), or conflicts with other related field operations.

The objective and purpose of the data collection and this FSP are identified in this RI/FS work plan. Applicable sampling and data-collection techniques are identified in the following sections of this FSP.

A3.1 DATA-COLLECTION TECHNIQUES

As discussed in Section A2.2, a variety of sample methods and measurements may be applicable to data-collection activities identified for Phase I-B characterization. The data needs identified through the DQO require sampling and surveys, including the following:

- Passive soil vapor
- Surface geophysics
- Logging of existing wells
- Direct pushes
- Radiological surveys
- Visual inspections.

This SAP includes a range of data-collection techniques that will be used to obtain further characterization information. Data-collection techniques used will be both intrusive (i.e., penetrate the vadose zone deeper than 0.30 m [1 ft]) and nonintrusive. The following subsections present intrusive and nonintrusive techniques that will be used under this SAP.

A3.1.1 Nonintrusive Data-Collection Techniques

Nonintrusive techniques consist of a broad range of geophysical, radiological, and field-screening applications that can provide data on radionuclides, physical parameters, chemicals, vapors, and other characteristics that add to the understanding of the nature and extent of contamination.

A3.1.1.1 Passive Soil-Vapor Surveys

Passive soil-vapor surveys will be used to screen the landfills for the presence of volatile organic compounds. Results will be used to provide a qualitative indication of contamination in the landfills and determine the general location of waste packages that may contain liquid organics that have breached their containment.

The utility of passive soil vapor surveys is directly proportional to their accuracy in reflecting and representing changes in the subsurface concentrations of source compounds. Passive soil-vapor surveys are collected from the vapor phase emanating from the source. The vapor phase is merely a fractional trace of the source; therefore, the units used in reporting detection values from passive soil vapor surveys are smaller than those employed for source compound concentrations.

Possible impacts from the regional carbon tetrachloride plume in the 200 West Area may affect survey results. However, later phases of intrusive characterization beneath the trench bottoms are expected to provide data needed to help differentiate between the regional plume and possible contributions from buried waste in the landfills.

Whatever the relative concentration of source and associated soil gas, best results are realized when the ratio of soil vapor measurements to actual subsurface concentrations remains as close to constant as possible. It is the reliability and consistency of this ratio, not the particular units of mass (e.g., nanograms), that determine usefulness. Therefore, follow-on intrusive sampling is required at points that show relatively high soil-vapor measurements, to obtain corresponding concentrations of buried contaminants. These values form the basis for approximating the required ratio. Once the ratio is established, it can be used in conjunction with the soil-vapor measurements (regardless of the units adopted) to estimate subsurface contaminant concentrations across the area surveyed. Specific conditions at individual sample points, including soil porosity and permeability and depth to contamination, can have significant impact on soil-vapor measurements at those locations.

The data can provide information that can be used to focus intrusive sampling and provide a list of expected compounds.

A3.1.1.1.1 Passive Soil Vapor Samplers

A passive soil-vapor sampler (EMFLUX or GORE-SORBER) consists of a glass vial containing hydrophobic adsorbent cartridges with a length of wire or string attached to the vial for retrieval. The sampler is placed in a shallow, vertical hole in the soil. The sampler is covered with soil, and the location of the sampler is recorded.

At the end of the exposure period, the samplers are withdrawn and sent to the appropriate laboratory for analysis.

A3.1.1.1.2 Sampling Design for Passive Soil Vapor

A two stage sampling design has been developed for this project for the detection of organic vapors:

- The Stage 1 passive organic vapor surveys will be performed in the 218-W-3, 218-W-3AE, 218-W-4B, and 218-W-5 Landfills. Specific locations in these landfills showed high concentrations (greater than 25 ng/sample) of organic vapors when surveyed during Phase I-A characterization activities. Additional organic vapor surveys are needed to focus locations for potential active organic vapor sampling. Passive organic vapor samplers will be placed in a circular pattern around the point that showed an elevated

concentration as a result of the Phase I-A surveys. Nine vapor samplers per Phase I-A sample location will be spaced approximately 9.1 m (30 ft) apart in a circular pattern to ensure some overlap of vapor detection. The landfills in which Stage 1 surveys will be performed, as well as trench numbers, and specific coordinates for sampler placement are listed in Table A3-1.

- The Stage 2 passive organic vapor surveys will be focused on those areas that showed a strong metallic signature during geophysical investigations performed as part of Phase I-A characterization activities. Passive organic vapor surveys will be used to determine if containers of carbon tetrachloride or other organic liquids may have been disposed of in these landfills. Carbon tetrachloride and other organic liquids were used in large quantities at the Plutonium Finishing Plant and other facilities during their operating history. The vapor samplers will be spaced approximately 9.1 m (30 ft) apart in a circular array to ensure some overlap of vapor detection. The number of samples per location will vary depending on the size and shape of the geophysical signature. The landfills in which Stage 2 surveys will be performed, as well as trench numbers, and specific coordinates for sampler placement are listed in Table A3-2.

Table A3-1. Stage 1 Passive Soil Vapor Survey Locations. (7 Pages)

Trench Number	Sample Location	WSP West/WSP North (Hanford West/Hanford East)
218-W-3A Landfill		
T04	T04-A-1	576300/147227 (77901/44500)
	T04-A-1a	576291/147227 (77901/44530)
	T04-A-1b	576282/147227 (77901/44560)
	T04-A-1c	576310/147227 (77901/44470)
	T04-A-1d	576319/147227 (77901/44440)
	T04-A-1e	576300/147236 (77931/44500)
	T04-A-1f	576300/147245 (77961/44500)
	T04-A-1g	576300/147217 (77871/44500)
	T04-A-1h	576300/147208 (77841/44500)
T05	T05-A-1	576288/147260 (78010/44540)
	T05-A-1a	576279/147260 (78010/44570)
	T05-A-1b	576270/147260 (78010/44600)
	T05-A-1c	576297/147260 (78010/44510)
	T05-A-1d	576306/147260 (78010/44480)
	T05-A-1e	576288/147269 (78040/44540)
	T05-A-1f	576288/147278 (78070/44540)
	T05-A-1g	576288/147251 (77980/44540)
	T05-A-1h	576288/147241 (77950/44540)

Table A3-1. Stage 1 Passive Soil Vapor Survey Locations. (7 Pages)

Trench Number	Sample Location	WSP West/WSP North (Hanford West/Hanford East)
T12	T12-A-1	576203/147254 (77992/44820)
	T12-A-1a	576194/147254 (77992/44850)
	T12-A-1b	576185/147254 (77992/44880)
	T12-A-1c	576212/147254 (77992/44790)
	T12-A-1d	576221/147254 (77992/44760)
	T12-A-1e	576203/147263 (78022/44820)
	T12-A-1f	576203/147272 (78052/44820)
	T12-A-1g	576203/147245 (77962/44820)
	T12-A-1h	576203/147236 (77932/44820)
T19	T19-A-1	576100/147086 (77443/45160)
	T19-A-1a	576090/147086 (77443/45190)
	T19-A-1b	576081/147086 (77443/45220)
	T19-A-1c	576109/147086 (77443/45130)
	T19-A-1d	576118/147087 (77443/45100)
	T19-A-1e	576100/147096 (77473/45160)
	T19-A-1f	576100/147105 (77503/45160)
	T19-A-1g	576100/147077 (77413/45160)
	T19-A-1h	576100/147068 (77383/45160)
T22	T22-A-1	576063/147235 (77931/45280)
	T22-A-1a	576054/147235 (77931/45310)
	T22-A-1b	576044/147235 (77931/45340)
	T22-A-1c	576072/147235 (77931/45250)
	T22-A-1d	576081/147235 (77931/45220)
	T22-A-1e	576063/147244 (77961/45280)
	T22-A-1f	576063/147253 (77991/45280)
	T22-A-1g	576063/147226 (77901/45280)
	T22-A-1h	576063/147217 (77871/45280)
T24	T24-A-1	576039/147087 (77445/45360)
	T24-A-1a	576030/147087 (77445/45390)
	T24-A-1b	576020/147087 (77445/45420)
	T24-A-1c	576048/147087 (77445/45330)
	T24-A-1d	576057/147087 (77445/45300)
	T24-A-1e	576039/147096 (77475/45360)
	T24-A-1f	576039/147105 (77505/45360)
	T24-A-1g	576039/147078 (77415/45360)
	T24-A-1h	576039/147069 (77385/45360)

Table A3-1. Stage 1 Passive Soil Vapor Survey Locations. (7 Pages)

Trench Number	Sample Location	WSP West/WSP North (Hanford West/Hanford East)
T29	T29-A-1	575978/147126 (77573/45560)
	T29-A-1a	575968/147126 (77573/45590)
	T29-A-1b	575959/147126 (77573/45620)
	T29-A-1c	575987/147126 (77573/45530)
	T29-A-1d	575996/147126 (77573/45500)
	T29-A-1e	575978/147135 (77603/45560)
	T29-A-1f	575978/147144 (77633/45560)
	T29-A-1g	575978/147117 (77543/45560)
	T29-A-1h	575978/147108 (77513/45560)
T31	T31-A-1	575953/147118 (77548/45640)
	T31-A-1a	575944/147118 (77548/45670)
	T31-A-1b	575935/147118 (77548/45700)
	T31-A-1c	575962/147118 (77548/45610)
	T31-A-1d	575972/147118 (77548/45580)
	T31-A-1e	575953/147127 (77578/45640)
	T31-A-1f	575953/147136 (77608/45640)
	T31-A-1g	575953/147109 (77518/45640)
	T31-A-1h	575953/147100 (77488/45640)
T33	T33-A-1	575929/147259 (78012/45720)
	T33-A-1a	575919/147259 (78012/45750)
	T33-A-1b	575910/147259 (78012/45780)
	T33-A-1c	575938/147259 (78012/45690)
	T33-A-1d	575947/147259 (78012/45660)
	T33-A-1e	575929/147269 (78042/45720)
	T33-A-1f	575929/147278 (78072/45720)
	T33-A-1g	575929/147250 (77982/45720)
	T33-A-1h	575929/147241 (77952/45720)
T34	T34-A-1	575916/147265 (78029/45760)
	T34-A-1a	575907/147265 (78029/45790)
	T34-A-1b	575898/147265 (78029/45820)
	T34-A-1c	575925/147265 (78029/45730)
	T34-A-1d	575935/147265 (78029/45700)
	T34-A-1e	575916/147274 (78059/45760)
	T34-A-1f	575916/147283 (78089/45760)
	T34-A-1g	575916/147255 (77999/45760)
	T34-A-1h	575916/147246 (77969/45760)

Table A3-1. Stage 1 Passive Soil Vapor Survey Locations. (7 Pages)

Trench Number	Sample Location	WSP West/WSP North (Hanford West/Hanford East)
T35	T35-A-1	575904/147265 (78030/45800)
	T35-A-1a	575895/147265 (78030/45830)
	T35-A-1b	575886/147265 (78030/45860)
	T35-A-1c	575913/147265 (78030/45770)
	T35-A-1d	575922/147265 (78030/45740)
	T35-A-1e	575904/147274 (78060/45800)
	T35-A-1f	575904/147283 (78090/45800)
	T35-A-1g	575904/147256 (78000/45800)
	T35-A-1h	575904/147247 (77970/45800)
T46	T46-A-1	575771/147084 (77438/46240)
	T46-A-1a	575761/147084 (77438/46270)
	T46-A-1b	575752/147084 (77438/46300)
	T46-A-1c	575780/147084 (77438/46210)
	T46-A-1d	575789/147084 (77438/46180)
	T46-A-1e	575770/147093 (77468/46240)
	T46-A-1f	575770/147102 (77498/46240)
	T46-A-1g	575771/147075 (77408/46240)
	T46-A-1h	575771/147066 (77378/46240)
TS1	TS1-A-1	576349/147134 (77597/44340)
	TS1-A-1a	576340/147134 (77597/44370)
	TS1-A-1b	576331/147134 (77597/44400)
	TS1-A-1c	576359/147134 (77597/44310)
	TS1-A-1d	576368/147134 (77597/44280)
	TS1-A-1e	576349/147143 (77627/44340)
	TS1-A-1f	576349/147152 (77657/44340)
	TS1-A-1g	576349/147125 (77567/44340)
	TS1-A-1h	576349/147116 (77537/44340)
TS3	TS3-A-1	576374/147209 (77844/44260)
	TS3-A-1a	576364/147209 (77844/44290)
	TS3-A-1b	576355/147209 (77844/44320)
	TS3-A-1c	576383/147209 (77844/44230)
	TS3-A-1d	576392/147209 (77844/44200)
	TS3-A-1e	576374/147219 (77874/44260)
	TS3-A-1f	576374/147228 (77904/44260)
	TS3-A-1g	576374/147200 (77814/44260)
	TS3-A-1h	576374/147191 (77784/44260)

Table A3-1. Stage 1 Passive Soil Vapor Survey Locations. (7 Pages)

Trench Number	Sample Location	WSP West/WSP North (Hanford West/Hanford East)
TS6	TS6-A-1	576410/147258 (78002/44140)
	TS6-A-1a	576401/147258 (78002/44170)
	TS6-A-1b	576392/147258 (78002/44200)
	TS6-A-1c	576419/147258 (78002/44110)
	TS6-A-1d	576428/147258 (78002/44080)
	TS6-A-1e	576410/147267 (78032/44140)
	TS6-A-1f	576410/147276 (78062/44140)
	TS6-A-1g	576410/147248 (77972/44140)
	TS6-A-1h	576410/147239 (77942/44140)
TS8	TS8-A-1	576435/147146 (77634/44060)
	TS8-A-1a	576426/147145 (77634/44090)
	TS8-A-1b	576416/147145 (77634/44120)
	TS8-A-1c	576444/147146 (77634/44030)
	TS8-A-1d	576453/147146 (77634/44000)
	TS8-A-1e	576435/147155 (77664/44060)
	TS8-A-1f	576435/147164 (77694/44060)
	TS8-A-1g	576435/147136 (77604/44060)
	TS8-A-1h	576435/147127 (77574/44060)
TS9	TS9-A-1	576447/147170 (77713/44020)
	TS9-A-1a	576438/147170 (77713/44050)
	TS9-A-1b	576429/147170 (77713/44080)
	TS9-A-1c	576456/147170 (77713/43990)
	TS9-A-1d	576465/147170 (77713/43960)
	TS9-A-1e	576447/147179 (77743/44020)
	TS9-A-1f	576447/147188 (77773/44020)
	TS9-A-1g	576447/147160 (77683/44020)
	TS9-A-1h	576447/147151 (77653/44020)
218-W-3AE Landfill		
T05	T05-A-1	575788/146842 (76642/46186)
	T05-A-1a	575778/146842 (76642/46216)
	T05-A-1b	575769/146842 (76642/46246)
	T05-A-1c	575797/146842 (76642/46156)
	T05-A-1d	575806/146842 (76642/46126)
	T05-A-1e	575788/146851 (76672/46186)
	T05-A-1f	575788/146860 (76702/46186)
	T05-A-1g	575788/146832 (76612/46186)
	T05-A-1h	575788/146823 (76582/46186)

Table A3-1. Stage 1 Passive Soil Vapor Survey Locations. (7 Pages)

Trench Number	Sample Location	WSP West/WSP North (Hanford West/Hanford East)
T08	T08-A-1	575826/146924 (76911/46060)
	T08-A-1a	575817/146924 (76911/46090)
	T08-A-1b	575807/146924 (76911/46120)
	T08-A-1c	575835/146924 (76911/46030)
	T08-A-1d	575844/146924 (76911/46000)
	T08-A-1e	575826/146933 (76941/46060)
	T08-A-1f	575826/146942 (76971/46060)
	T08-A-1g	575826/146915 (76881/46060)
	T08-A-1h	575826/146905 (76851/46060)
T10	T10-A-1	575904/146839 (76631/45804)
	T10-A-1a	575895/146839 (76631/45834)
	T10-A-1b	575886/146838 (76631/45864)
	T10-A-1c	575913/146839 (76631/45774)
	T10-A-1d	575922/146839 (76631/45744)
	T10-A-1e	575904/146848 (76661/45804)
	T10-A-1f	575904/146857 (76691/45804)
	T10-A-1g	575904/146829 (76601/45804)
	T10-A-1h	575904/146820 (76571/45804)
218-W-4B Landfill		
T08	T08-A-1	577449/147194 (77784/40732)
	T08-A-1a	577440/147194 (77784/40762)
	T08-A-1b	577431/147194 (77784/40792)
	T08-A-1c	577458/147194 (77784/40702)
	T08-A-1d	577467/147194 (77784/40672)
	T08-A-1e	577449/147203 (77814/40732)
	T08-A-1f	577449/147212 (77844/40732)
	T08-A-1g	577449/147185 (77754/40732)
	T08-A-1h	577449/147175 (77724/40732)
218-W-4C Landfill		
T58	T58-A-1	578309/147247 (77953/37910)
	T58-A-1a	578300/147247 (77953/37940)
	T58-A-1b	578290/147247 (77953/37970)
	T58-A-1c	578318/147247 (77953/37880)
	T58-A-1d	578327/147247 (77953/37850)
	T58-A-1e	578309/147257 (77983/37910)
	T58-A-1f	578309/147266 (78013/37910)
	T58-A-1g	578309/147238 (77923/37910)
	T58-A-1h	578309/147229 (77893/37910)

Table A3-1. Stage 1 Passive Soil Vapor Survey Locations. (7 Pages)

Trench Number	Sample Location	WSP West/WSP North (Hanford West/Hanford East)
218-W-5 Landfill		
T22	T22-A-1	576012/147477 (78724/45445)
	T22-A-1a	576003/147477 (78724/45475)
	T22-A-1b	575994/147477 (78724/45505)
	T22-A-1c	576021/147477 (78724/45415)
	T22-A-1d	576030/147477 (78724/45385)
	T22-A-1e	576012/147486 (78754/45445)
	T22-A-1f	576012/147495 (78784/45445)
	T22-A-1g	576012/147467 (78694/45445)
	T22-A-1h	576012/147458 (78664/45445)

WSP = Washington State Plane.

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Table A3-2. Stage 2 Passive Soil Vapor Survey Locations. (3 Pages)

Sample Location	WSP West/WSP North (Hanford West/Hanford East)
218-E-5 and 218-E-5A	
1	573446/137028 (53949/44454)
2	573385/137033 (54151/44471)
3	573385/137022 (54151/44435)
4	573437/137046 (53978/44514)
5	573350/137064 (54264/44573)
6	573353/137049 (54254/44523)
7	573401/137092 (54096/44666)
8	573437/137094 (53978/44670)
9	573343/137085 (54286/44642)
10	573437/137076 (53978/44611)
11	573431/137085 (53998/44641)
12	573418/137128 (54042/44784)
218-E-8	
1	575136/137193 (48404/44981)
2	575419/137200 (47475/44999)
218-E-2A	
1	573492/135990 (53809/41048)
218-E-1	
1	574706/135678 (49828/40014)
2	574749/135544 (49689/39573)
3	574742/135568 (49712/39652)
4	574738/135687 (49722/40041)
5	574779/135564 (49589/39638)

Table A3-2. Stage 2 Passive Soil Vapor Survey Locations. (3 Pages)

Sample Location	WSP West/WSP North (Hanford West/Hanford East)
218-E-12A	
1	574952/136676 (49010/43287)
2	574952/136699 (49010/43361)
3	574863/136710 (49304/43399)
4	574840/136744 (49378/43510)
5	574814/136751 (49464/43535)
6	574989/136949 (48888/44181)
7	574836/136979 (49388/44281)
8	574836/136994 (49388/44330)
9	574026/136994 (52046/44338)
10	575026/137017 (48764/44406)
218-W-1 and 218-W-2	
1	566152/136048 (77892/41302)
2	566339/136053 (77277/41317)
3	566182/136263 (77792/42007)
4	566302/136300 (77398/42129)
5	566342/136345 (77267/42274)
6	566172/135988 (77827/41105)
7	566260/135978 (77538/41071)
8	566275/136178 (77488/41727)
218-W-1A	
1	567013/137088 (75057/44708)
2	564028/137088 (84852/44732)
3	567013/137100 (75057/44747)
4	567004/137124 (75087/44826)
5	567007/137136 (75077/44865)
6	567097/137157 (74781/44933)
7	567019/137166 (75037/44964)
8	567079/137190 (74840/45042)
9	567115/137181 (74722/45012)
10	567121/137214 (74702/45120)
11	566989/137190 (75135/45043)
12	567001/137208 (75096/45102)
13	567181/137211 (74505/45110)
218-W-2A	
1	566261/136758 (77529/43632)
2	566328/136661 (77309/43311)
3	566428/136658 (76981/43302)
4	566411/136731 (77038/43540)
5	566461/136813 (76873/43811)
6	566393/136868 (77094/43992)
7	566348/136888 (77241/44058)
8	566301/136903 (77397/44107)

Table A3-2. Stage 2 Passive Soil Vapor Survey Locations. (3 Pages)

Sample Location	WSP West/WSP North (Hanford West/Hanford East)
9	566533/136848 (76635/43925)
10	566303/136963 (77388/44304)
11	566545/136906 (76595/44113)
12	566508/136921 (76716/44163)
13	566456/136938 (76888/44221)
14	566418/136953 (77011/44270)
15	566376/136966 (77150/44312)
16	566328/136986 (77306/44378)
17	566578/136923 (76486/44171)
18	566583/136943 (76470/44236)
19	566653/136943 (76240/44236)
218-W-3	
1	566112/136690 (78019/43408)
2	566103/136713 (78046/43484)
3	566118/136702 (77999/43447)
4	566179/136717 (77797/43496)
5	566154/136791 (77878/43740)
6	566134/136807 (77944/43792)
7	566196/136802 (77743/43777)
8	566214/136797 (77681/43759)
9	566214/136800 (77681/43769)
10	566308/136813 (77375/43813)
11	566235/136800 (77612/43769)
12	566235/136750 (77613/43606)
218-W-11	
1	566170/136328 (77829/42222)
2	566184/136330 (77785/42227)
3	566203/136328 (77721/42222)
4	566248/136333 (77573/42236)

WSP = Washington State Plane.

A3.1.1.1.3 Positional Surveying

All sampling locations established during this sampling activity will be surveyed after the sampling and decommissioning activities are completed. Surveys will be performed according to approved procedures. Data will be recorded in the *North American Vertical Datum of 1988* (NAVD88) and the Washington State Plane (South Zone) *North American Datum of 1983* (NAD83), with the 1991 adjustment for horizontal coordinates. All survey data will be recorded in meters and feet.

A3.1.1.2 Surface Geophysical Surveys

The geophysical techniques used in previous investigations at the 200-SW-2 OU landfills in 2005 and 2006 were the GPR, EMI, and TMF methods. These methods were selected because they are cost-effective and nonintrusive and have been successful in similar waste characterization projects conducted at the Hanford Site. These same methods may be used for the scope addressed in this SAP; however, other methods also may be considered for application. Brief descriptions of the GPR, electromagnetic induction, and TMF methods are provided in the following subsections.

Landfills selected for surface geophysical investigations are listed in Table A3-3. This table also lists number of trenches (if known), as well as total surface area of the landfill to be surveyed. The total surface area may be reduced if no-walk or no-drive zones are present in these landfills that would limit access by workers and survey equipment.

Table A3-3. Geophysical Survey Locations.

Landfill	Length in m (ft)[a]	Width in m (ft)[a]	Number of Trenches	Estimated Area in ha (acres)[a]
218-E-2	165 (541)	134 (441)	[b]	0.20 (0.51)
218-E-4	238 (780)	61 (200)	[b]	1.38 (3.4)
218-E-9	130 (427)	30 (100)	[b]	0.39 (0.96)
218-W-4A	320 (1,050)	267 (875)	30	7 (18)
Total				9 (23)

[a]All dimensions are approximate.
[b]No information is available to determine the number of trenches for these sites.

A3.1.1.2.1 Frequency-Domain Electromagnetic Induction

The Geonics EM31 Terrain Conductivity Meter[3] is a frequency-domain EMI instrument that is designed to measure the apparent electrical conductivity of soil and to detect ferrous and nonferrous metal objects to a depth of approximately 3 to 4 m (10 to 12 ft) (in ideal situations). The EM31 consists of a transmitter coil and receiver coil at either end of a 4 m (12 ft) long

[3] Geonics EM31 is a trademark of Geonics Limited, Mississauga, Ontario, Canada.

boom. The transmitter generates pulses of electromagnetic energy (the primary field) at regular intervals, which are transmitted into the ground where they induce eddy currents in electrically conductive material (soil and/or metal objects). The induced eddy currents generate their own electromagnetic field (the secondary field), which transmits back toward the instrument. The receiver coil on the EM31 measures and records the strength of the secondary field both in phase and out of phase with the primary field transmitter. The in-phase component of the measurement is most strongly influenced by the presence of metallic objects in the subsurface, while the out-of-phase component is directly related to the electrical conductivity of the surrounding soil.

The normal mode of operation is to mark out regularly spaced data-collection lines and then walk down the lines with the instrument held at hip height, collecting data at regularly spaced intervals. Both the in-phase and the out-of-phase (terrain conductivity) measurements are collected and plotted for analysis. The instrument is most useful for locating large concentrations of buried metallic objects and for detecting subtle shifts in background soil properties. While the EM31 is capable of detecting drum-size metallic objects to a depth of 3 to 4 m (10 to 12 ft) in ideal situations, the lateral resolution of the position of detected objects is on the order of +/-1 m.

Conditions that limit the detection capability of the EM31 include high-background soil conductivities and proximity to cultural interference such as buildings and fences. High soil conductivities have the effect of limiting the depth of investigation of the instrument, because they significantly attenuate the propagation of the primary and secondary fields. This same phenomenon limits GPR depth of investigation in areas of high soil conductivity. Large, metallic surface features effectively can skew the results of the data. Sites with a significant number of buried utilities also may generate data that are difficult to interpret.

A3.1.1.2.2 Total Magnetic Field/Vertical Gradient

A magnetometer measures the intensity of the earth's magnetic field. The presence of ferrous material, man-made or natural, creates local variations in the strength of the earth's overall magnetic field. These variations are proportional to several factors, including the mass of the ferrous material and the distance between the ferrous material and the detector. The distance is significant, because it changes the response by a factor of one over the distance cubed. The primary measurement that will be taken is the TMF intensity. The TMF, as the name implies, is a summation of all of the magnetic variables around the sensor. When the ferromagnetic sources are close to the detector, large variations in the TMF can occur. Therefore, it often is difficult to differentiate individual anomalies based on the TMF alone.

To improve the resolution of a magnetic survey, the magnetic gradient also can be measured. This is accomplished by making two simultaneous TMF measurements at each data point, using two sensors separated by a fixed vertical distance. The difference between the two measurements is the vertical magnetic gradient (referred to in this document as the magnetic gradient). The response to ferrous material falls off at a rate of one over the distance to the fourth power. Because of this, the magnetic gradient measurement should help differentiate individual anomalies and waste boundaries better than the TMF alone. Both the TMF and gradient values typically are displayed on contour maps for analysis.

A3.1.1.2.3 Ground-Penetrating Radar

The GPR system uses a transducer to transmit electromagnetic energy into the ground. Interfaces in the ground, defined by contrasts in dielectric constants, magnetic susceptibility, and, to some extent, electrical conductivity, reflect the transmitted energy. The GPR system then measures the travel time between transmitted pulses and the arrival of reflected energy. Buried objects (such as pipes, barrels, foundations, wires) can cause all or a portion of the transmitted energy to be reflected back toward a receiving antenna. Geologic features such as cross-bedding, lateral and vertical changes in soil properties, and rock interfaces also can cause reflections of a portion of the electromagnetic energy.

The velocity of the electromagnetic energy primarily is controlled by the dielectric constant and magnetic susceptibility of the medium. For calculating depth, values of electromagnetic velocities are determined by measurement, experience in an area, ties to known buried reflectors, and knowledge of the subsurface medium.

The effective depth of investigation is a function of the transmitted power, receiver sensitivity, frequency of the antenna, and attenuation of the transmitted energy from the geologic medium. The maximum depth of investigation may vary significantly as a result of changing soil conditions. High attenuation and, therefore, smaller penetration depths of the electromagnetic energy typically occur where the soil conductivity is elevated and/or in areas with numerous reflective interfaces. Depth of investigation also is affected by highly conductive material, such as metal drums or pipes, that essentially reflects all of the energy. The method cannot "see" directly below areas of highly reflective material, because all of the energy is reflected.

The reflected energy provides the means for mapping the subsurface features of interest, whether synthetic or geologic.

A3.1.1.2.4 Survey Grid Parameters

Civil survey coordinates shown on the site drawings will be used to develop base grids at each site. Base grids will be created on centers of a chosen distance throughout the individual sites. The coordinates of the nodes will be supplied to Fluor Hanford civil survey personnel, who will use Global Position System instrumentation to stake the grids in the field. Personnel then will mark data collection lines at set intervals between the nodes.

The geophysical data plots will be presented in local grid coordinates. The local grids generally are established by assigning, to the southwestern-most grid node, the arbitrary location of North 100, East 100 (N100/E100). Positions then can be measured from this position. In some instances, the grids may be expanded after establishment and therefore may have coordinates less than N100/E100. The interpretation drawings for each site will show Washington State Plane coordinates (in meters) for selected grid nodes, allowing a tie between them and the local grid coordinates.

A3.1.1.2.5 Sampling Design for Surface Geophysical Surveys

Surface geophysical investigations will be performed as reconnaissance-type surveys that are aimed at defining the following characteristics:

- Locations of landfill trench edges, ends, and centerlines
- Locations of buried waste or other significant features/anomalies
- Presence and extent of voids within a given trench
- Definition of most likely waste container type (e.g., wood, metal boxes, metal drums, cardboard, waste item)
- Differentiation between different types of waste containers in a given trench
- Depth of soil cover above waste items
- Depth to trench bottom (where possible).

The depth of investigation for the geophysical instruments used in this work is limited to approximately 3 to 4 m (10 to 12 ft). Geophysical survey locations are indicated in Table A3-3. Unless otherwise noted, the entire landfill will be surveyed using geophysical techniques.

A3.1.1.3 Visual Inspections and Historical Information Reviews for Unused Portions of Landfills

Portions of three of the RCRA TSD-unit landfills within the 200-SW-2 OU never have received buried waste. Annexes of the 218-W-4C and 218-E-10 Landfills, as well as unused portions of the 218-E-12B Landfill, were intended to be used for future disposal of waste; however, no waste disposals are known to have taken place in these areas. In addition, the 218-W-6 Landfill is not known to have received waste. Although this landfill is not in the scope of this RI/FS work plan, coordination with the 200-MG-1 OU may be performed to investigate this landfill during the same timeframe that the other areas are investigated. The 200-SW-2 and 200-MG-1 OUs will evaluate and take advantage of efficiencies that could be realized from coordination of these activities.

Visual inspection of unused portions and annexes of landfills will be performed during site walkdowns, coupled with review of aerial photographs, to locate disturbed soil within these areas. Areas that appear to be disturbed may be surveyed using geophysical techniques and/or radiological surveys to ensure that no waste is buried in these areas. Other historical information also may be reviewed to determine if waste has been buried at these sites.

After field surveys are completed, these areas of unused landfills will be administratively reclassified in the *Waste Information Data System* database. Those steps required to reclassify these areas are described in Chapter 5.0 of the RI/FS work plan.

A3.1.2 Intrusive Data-Collection Techniques

Intrusive characterization techniques to be used during Phase I-B consist of geophysical logging of existing monitoring wells, direct-pushes within the boundaries of the landfills, and remote camera and radiological surveys of potentially unused caissons. These techniques can provide data on radionuclides, physical parameters, chemicals, and other characteristics that add to the understanding of the nature and extent of contamination. The following subsections describe the techniques to be used in Phase I-B.

A3.1.2.1 Downhole Geophysical Logging

Logging data from existing monitoring wells will be reviewed for applicability to 200-SW-2 OU landfills. Information regarding soil moisture content with depth, site stratigraphy, and the presence of radionuclides or other contaminants is of particular interest in support of efforts to determine the nature and extent of contamination. Phase I-B will provide preliminary information and support site investigation scoping for subsequent intrusive phases focused on determining the nature and extent of contamination. At least one upgradient and one downgradient monitoring well will be logged with a high-resolution spectral gamma-ray logging system to provide continuous vertical logs of gamma-emitting radionuclides, and with a neutron moisture-logging system to identify moisture changes (additional wells may be logged depending on the results from the upgradient and downgradient wells). The spectral gamma logging of existing wells in the vicinity of a landfill can be a cost-effective method of providing data on the vertical and lateral distribution of gamma-emitting radionuclides. The spectral gamma logging system uses instrumentation to identify and quantify gamma-emitting radionuclides in wells as a function of depth.

The spectral gamma logging system uses laboratory-grade high-purity germanium detectors or sodium iodide detectors to collect gamma energy spectra at discrete depth increments. Radionuclide identification and assay are based on characteristic gamma emissions associated with decay. At each depth increment, the gamma energy spectrum is analyzed to detect peaks, and to determine net count rate, counting error, and minimum detectable activity for each peak. The energy resolution capability of the detector varies between approximately 2 and 4 keV, depending on energy level and background activity. Net counts from individual gamma energy peaks are processed with the detector calibration function, dead time correction, casing correction, and water correction to determine the bulk concentration, analytical error, and minimum detectable level. All quantities are reported in picocuries per gram. For selected radionuclides, specific regions of interest can be "forced" to determine the minimum detectable activity even when no peak is detected. Thus, the minimum detectable activity and analytical error are calculated on a point-by-point basis and shown on the log plot. The minimum detectable activity depends on the intensity (yield) of the characteristic gamma ray, detector efficiency, casing thickness, and background activity level.

A logging system is defined as a unique combination of downhole sonde (detector) and logging system (cable, winch, power supply, control system, and data acquisition system). The spectral gamma logging system and the neutron moisture logging system are calibrated on an annual basis, or after any significant repairs or modifications to either the sonde or the logging system. Calibration measurements are made at the Hanford Calibration Facility, located near the central

weather station, just east of the Hanford Site 200 West Area. Each calibration is documented with a calibration certificate.

The neutron-moisture logging system, which measures moisture, employs a weak americium beryllium neutron source and neutron detector to provide a direct reading of hydrogen atom distribution in the soil surrounding the borehole. This detector will be used to measure continuous vertical moisture in the vadose zone. The spectral gamma logs will be used to aid in determining the vertical distribution of radionuclides in the vadose zone beneath the landfills and to aid in geological interpretation of subsurface stratigraphy.

The spectral gamma logging equipment calibration is conducted annually, and the data acquired during the calibrations are used to derive factors that convert measured peak-area count rate to radionuclide concentrations in picocuries per gram. Corrections are applied to the data to compensate for the gamma ray attenuation by the casing.

A3.1.2.1.1 Sampling Design for Geophysical Logging of Existing Wells

Table A3-4 lists wells within 50 m (164 ft) of the 24 landfills in the scope of this SAP that are currently available for logging. Following review of existing logging data and determination of applicability and utility in determining site stratigraphy, soil moisture content, and presence of contamination, the logging techniques listed in the section above will be used to log at least one upgradient and one downgradient well if no information exists.

Geophysical logging data will be collected in HEIS; a summary report also will be prepared by the logging contractor to document the logging activity and results. The logging summary reports will be documented in the field summary report so they can be referenced in the RI report and other documents as necessary.

A3.1.2.2 Direct-Push Techniques and Logging

Direct-push techniques (DPT) use a pushing method, such as a diesel hammer, hydraulic hammer, cone penetrometer, or GeoProbe,[4] to penetrate the vadose zone to obtain downhole geophysical data (e.g., small-diameter spectral gamma, moisture). These methods generally are limited in the depth of penetration and in sample volume as compared to borehole drilling; they generally are less expensive than drilling, however. In general, these methods do not generate drill cuttings, thereby minimizing personnel exposure to contamination and minimizing the volume of investigation-derived waste.

Direct-push holes will be installed to obtain spectral gamma, neutron moisture, and/or passive neutron logs as discussed in the following section. Direct-push holes are decommissioned in the same manner as standard boreholes, in accordance with appropriate state regulations. Maximum depth for these techniques is near 33 m (100 ft), based on experience at the Hanford Site.

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[4] GeoProbe is a registered trademark of Kejr, Inc., Salina, Kansas.

Table A3-4. Existing Wells Available for Logging. (4 Pages)

Well Name	Well Purpose	Date Last Sampled	Drill Date	Drill Depth (ft)	Hanford Easting Coordinate	Hanford Northing Coordinate	Landfill within 50 m
B2485	Unclassified	Unknown	30-Apr-96	99	574431.043	136501.929	216-C-9
B2484	Unclassified	Unknown	30-Apr-96	99	574393.288	136495.588	218-C-9
B2486	Unclassified	Unknown	30-Apr-96	102	574393.488	136504.880	218-C-9
B2487	Unclassified	Unknown	30-Apr-96	104	574430.167	136492.918	218-C-9
299-E28-26	Groundwater	22-Dec-06	6-Nov-87	329	572941.553	137024.016	218-E-10
299-E28-27	Groundwater	22-Dec-06	29-Sep-87	302	573226.784	137070.063	218-E-10
299-E28-28	Groundwater	18-Jan-07	17-Apr-90	296	572804.351	137108.259	218-E-10
299-E32-10	Groundwater	19-Dec-06	15-Apr-92	246	572951.130	137741.690	218-E-10
299-E32-2	Groundwater	19-Dec-06	30-Sep-87	289	572648.020	137467.509	218-E-10
299-E32-3	Groundwater	10-Jan-07	30-Sep-87	304	572600.614	137383.996	218-E-10
299-E32-4	Groundwater	3-Jan-07	30-Sep-87	311	572603.743	137187.218	218-E-10
299-E32-5	Groundwater	19-Dec-06	9-Nov-89	294	572599.697	137285.125	218-E-10
299-E32-6	Groundwater	19-Dec-06	1-Aug-91	279	572600.400	137515.100	218-E-10
299-E32-7	Groundwater	3-Jan-07	26-Jul-91	274	572600.380	137647.050	218-E-10
299-E32-8	Groundwater	10-Jan-07	10-Jun-91	257	572663.390	137741.470	218-E-10
299-E32-9	Groundwater	4-Jan-07	12-Jul-91	255	572795.110	137741.690	218-E-10
299-E33-10	Groundwater	12-May-03	30-Apr-55	290	573255.504	137258.189	218-E-10
299-E33-28	Groundwater	10-Jan-07	15-Oct-87	278	573226.365	137375.019	218-E-10
299-E33-29	Groundwater	10-Jan-07	30-Sep-87	291	573227.858	137231.193	218-E-10
299-E33-30	Groundwater	21-Dec-06	30-Sep-87	280	572923.796	137467.779	218-E-10
299-E33-34	Groundwater	21-Dec-06	23-Apr-90	240	573104.458	137740.427	218-E-10
299-E33-35	Groundwater	21-Dec-06	17-Apr-90	250	573220.798	137605.098	218-E-10
299-E27-109	Vadose	Unknown	30-Apr-75	100	575124.874	136612.062	218-E-12A
299-E27-124	Vadose	Unknown	31-Mar-77	60	575108.300	136635.100	218-E-12A
299-E27-15	Groundwater	22-Dec-06	3-Oct-89	263	575095.256	136630.359	218-E-12A
299-E27-10	Groundwater	18-Jan-07	19-Aug-87	240	575100.298	137052.481	218-E-12B

Table A3-4. Existing Wells Available for Logging. (4 Pages)

Well Name	Well Purpose	Date Last Sampled	Drill Date	Drill Depth (ft)	Hanford Easting Coordinate	Hanford Northing Coordinate	Landfill within 50 m
299-E27-11	Groundwater	30-Oct-06	18-Oct-89	265	574652.930	137062.736	218-E-12B
299-E27-17	Groundwater	1-Nov-06	11-Nov-91	246	574547.310	137122.010	218-E-12B
299-E27-8	Groundwater	1-Nov-06	30-Sep-87	257	574759.080	137044.178	218-E-12B
299-E27-9	Groundwater	1-Nov-06	31-Aug-87	245	574917.649	137040.904	218-E-12B
299-E34-10	Groundwater	7-Nov-06	29-Oct-91	249	574284.400	137224.570	218-E-12B
299-E34-12	Groundwater	1-Nov-06	15-Apr-92	248	574411.004	137168.544	218-E-12B
299-E34-2	Groundwater	7-Nov-06	30-Sep-87	242	574634.810	137220.694	218-E-12B
299-E34-5	Groundwater	11-Apr-05	15-Aug-87	192	574643.809	137743.332	218-E-12B
299-E34-7	Groundwater	11-Aug-05	17-Oct-89	206	575274.184	137357.745	218-E-12B
299-E34-8	Groundwater	1-Nov-06	20-Apr-90	260	574206.438	137249.622	218-E-12B
299-E34-9	Groundwater	7-Nov-06	5-Nov-91	235	574186.020	137429.820	218-E-12B
299-E35-51	Vadose	Unknown	N/A	#N/A	575088.700	137069.300	218-E-12B
299-W11-18	Groundwater	17-Aug-06	1-Mar-67	300	567181.916	137161.484	218-W-1A
299-W11-31	Groundwater	17-Feb-99	25-Feb-92	267	567221.580	137235.280	218-W-1A, 218-W-6
299-W6-4	Groundwater	24-Feb-00	26-Nov-91	258	567132.250	137290.490	218-W-1A, 218-W-6
299-W15-49	Groundwater	28-Nov-06	1-Nov-04	435	566307.200	135972.910	218-W-2, 218-W-4B
299-W10-179	Vadose	Unknown	31-Aug-78	23	566242.787	136999.124	218-W-2A, 218-W-3A
299-W10-19	Groundwater	6-Sep-05	24-Jul-92	238	566346.190	137037.140	218-W-2A, 218-W-3A
299-W10-21	Groundwater	19-Sep-05	27-Aug-93	232	566583.991	137154.721	218-W-2A, 218-W-3AE
299-W10-20	Groundwater	16-Mar-06	18-Nov-93	251	566249.695	136866.607	218-W-3, 218-W-3A, 218-W-2A
299-W7-11	Groundwater	22-Jan-02	24-May-91	235	566186.200	137636.000	218-W-3A
299-W7-2	Groundwater	19-Nov-97	30-Sep-87	236	566302.803	137638.502	218-W-3A
299-W7-3	Groundwater	26-Oct-06	23-Nov-87	477	566292.031	137638.641	218-W-3A
299-W10-31	Groundwater	3-Oct-06	20-Apr-06	279	566266.440	136968.340	218-W-3A, 218-W-2A
299-W10-29	Groundwater	3-Oct-06	1-Mar-06	287	566082.980	136828.740	218-W-3A, 218-W-3, 218-W-5

Table A3-4. Existing Wells Available for Logging. (4 Pages)

Well Name	Well Purpose	Date Last Sampled	Drill Date	Drill Depth (ft)	Hanford Easting Coordinate	Hanford Northing Coordinate	Landfill within 50 m
299-W7-4	Groundwater	26-Oct-06	19-Nov-87	235	566408.771	137308.243	218-W-3A, 218-W-3AE
299-W7-12	Groundwater	23-Sep-05	28-May-91	245	566040.800	137636.300	218-W-3A, 218-W-5
299-W7-5	Groundwater	17-Mar-05	19-Nov-87	229	566476.026	137635.688	218-W-3AE
299-W7-6	Groundwater	29-Jan-03	2-Nov-87	243	566658.078	137636.314	218-W-3AE
299-W7-7	Groundwater	9-Sep-03	27-Nov-89	231	566566.749	137636.075	218-W-3AE
299-W15-2	Groundwater	23-Aug-06	12-Aug-54	261	566093.762	136336.237	218-W-4A
299-W15-224	Groundwater	22-Jan-07	8-Feb-06	274	566307.890	135926.080	218-W-4B
299-W15-207	Vadose	Unknown	31-Aug-78	27	566200.578	135874.550	218-W-4B
299-W15-83	Groundwater	22-Jan-07	9-Aug-05	278	566304.520	135826.240	218-W-4B
299-W15-15	Groundwater	22-Jan-07	2-Sep-87	255	566088.805	135751.493	218-W-4B, 218-W-4C
299-W15-30	Groundwater	31-Jan-07	5-May-95	268	566304.617	135748.936	218-W-4B, 218-W-4C
244-W15-1	Soil Tube	30-Mar-04	4-Nov-02	35	566252.657	135662.527	218-W-4C
244-W15-2	Soil Tube	30-Mar-04	4-Nov-02	10	566252.200	135662.527	218-W-4C
244-W15-3	Soil Tube	3-Jun-04	4-Nov-02	32	566305.250	135674.346	218-W-4C
299-W15-14	Groundwater	27-Sep-05	15-Dec-76	581	566093.439	135648.274	218-W-4C
299-W15-152	Groundwater	29-Jan-07	15-Sep-05	358	566309.400	135550.000	218-W-4C
299-W15-16	Groundwater	29-Sep-05	10-Sep-87	244	566307.006	135733.625	218-W-4C
299-W15-17	Groundwater	31-Jan-07	28-Oct-87	450	566306.891	135718.958	218-W-4C
299-W15-94	Groundwater	29-Jan-07	19-Sep-05	278	566307.580	135640.340	218-W-4C
299-W18-157	Soil Tube	30-Aug-06	31-Aug-76	110	566357.809	135368.180	218-W-4C
299-W18-21	Groundwater	22-Jan-07	29-Jul-87	227	566097.700	134978.692	218-W-4C
299-W18-22	Groundwater	26-Jan-07	25-Sep-87	455	566088.632	134990.157	218-W-4C
299-W18-23	Groundwater	22-Aug-06	1-Jul-87	255	566084.533	135342.438	218-W-4C
299-W18-24	Groundwater	18-Feb-03	10-Aug-87	240	566370.843	135346.316	218-W-4C
299-W18-247	Soil Tube	30-Jan-07	6-May-92	227	566503.137	135231.658	218-W-4C
299-W18-27	Groundwater	15-Jan-03	7-May-91	239	566090.189	135226.541	218-W-4C

Table A3-4. Existing Wells Available for Logging. (4 Pages)

Well Name	Well Purpose	Date Last Sampled	Drill Date	Drill Depth (ft)	Hanford Easting Coordinate	Hanford Northing Coordinate	Landfill within 50 m
299-W18-28	Groundwater	14-Jul-98	9-May-91	230	566092.569	135106.788	218-W-4C
299-W18-3	Groundwater	17-Dec-90	15-Jan-59	450	566212.102	135529.497	218-W-4C
299-W18-32	Groundwater	20-Jan-99	29-Jul-92	225	566515.584	134975.641	218-W-4C
CPT-10	Soil Tube	19-Dec-06	N/A	107	566354.000	135334.000	218-W-4C
CPT-34	Soil Tube	26-Sep-06	14-May-96	86	566375.560	135288.030	218-W-4C
299-W10-13	Groundwater	12-Mar-02	25-Sep-87	250	566027.407	136606.806	218-W-5
299-W10-14	Groundwater	3-Oct-06	18-Nov-87	462	566017.194	136608.895	218-W-5
299-W7-1	Groundwater	9-Sep-03	30-Jul-87	245	565932.047	137647.125	218-W-5
299-W7-9	Groundwater	29-Jan-03	11-Apr-90	252	565844.438	137646.402	218-W-5
299-W8-1	Groundwater	17-Nov-06	23-Jul-87	271	565749.422	137646.639	218-W-5
299-W9-1	Groundwater	4-Apr-00	22-Oct-87	295	565657.655	137023.769	218-W-5
299-W10-30	Groundwater	3-Oct-06	14-Mar-06	283	566082.780	136739.330	218-W-5, 218-W-3
299-W6-1	Groundwater	6-Jun-97	7-Aug-57	476	567214.128	137510.135	218-W-6
299-W6-10	Groundwater	1-Sep-05	13-Feb-92	278	567413.340	137453.050	218-W-6
299-W6-11	Groundwater	10-Apr-06	21-May-92	280	567162.516	137634.825	218-W-6
299-W6-12	Groundwater	10-Apr-06	14-Apr-92	259	566915.534	137635.159	218-W-6
299-W6-6	Groundwater	10-Apr-06	24-Oct-91	472	567318.740	137638.720	218-W-6
299-W6-7	Groundwater	4-Feb-03	17-Jul-91	276	567311.300	137638.800	218-W-6
299-W6-3	Groundwater	17-Jul-02	15-Oct-91	441	567118.180	137299.130	218-W-6, 218-W-1A
299-W6-9	Groundwater	18-Aug-00	22-Feb-92	253	567031.610	137363.120	218-W-6, 218-W-1A
299-W7-10	Groundwater	18-Apr-00	17-Apr-90	244	566858.212	137457.533	218-W-6, 218-W-3AE
299-W7-8	Groundwater	13-Mar-02	13-Dec-89	241	566761.393	137636.665	218-W-6, 218-W-3AE

N/A = not applicable.

A3.1.2.2.1 Sampling Design for Direct-Push Techniques

The DPT will be used in the centers of each of the 24 landfills. The pushes will be located at the coordinates listed in Table A3-5. Pushes will be placed in areas between trenches, so that the buried waste is not penetrated. Logging, as described in Section A3.1.1.3, will be performed within these pushes.

Table A3-5. Direct-Push Locations. (2 Pages)

Landfill	Hanford Northing Coordinate	Hanford Easting Coordinate
Landfill Centroids		
218-C-9	136474.3	574615.3
218-E-1	135574.9	574754.7
218-E-10	137267.6	572944.8
218-E-12A	136814.3	574935.1
218-E-12B	137197.1	574926.5
218-E-2	137077.9	573510.5
218-E-2A	136991.1	573545.8
218-E-4	136890.7	573497.0
218-E-5	137079.6	573417.1
218-E-5A	137087.6	573355.9
218-E-8	137224.7	575115.4
218-E-9	137078.2	573584.2
218-W-1	136221.5	566205.1
218-W-11	136318.6	566204.9
218-W-1A	137184.3	567059.8
218-W-2	136062.0	566205.5
218-W-2A	136907.2	566437.5
218-W-3	136746.3	566161.0
218-W-3A	137272.9	566228.4
218-W-3AE	137391.3	566616.5
218-W-4A	136490.9	566227.8
218-W-4B	135880.5	566190.6
218-W-4C	135352.5	566200.4
218-W-5	137164.6	565869.7
Additional Pushes Based on Area of Liquid Infiltration		
218-W-3A	137513.7	566236.3
218-W-3A	137393.3	566236.6
218-W-3A	137200.4	566237.2
218-W-3A	137127.9	566237.3
218-W-3A	136953.0	566179.2

Table A3-5. Direct-Push Locations. (2 Pages)

Landfill	Hanford Northing Coordinate	Hanford Easting Coordinate
218-W-4B	135926.3	566190.5
218-W-4B	135834.6	566190.7
218-W-4C	135656.2	566191.3
218-W-4C	135526.0	566142.3
218-W-4C	135230.8	566212.9
218-W-4C	135109.1	566213.2
218-E-12B	137065.3	574774.7
218-E-12B	137195.8	575011.8
218-E-12B	137198.3	574841.2

In addition to the center pushes, additional pushes will be performed in those landfills that have experienced historical events, such as rapid snowmelt or infiltration of water, that could have provided a mechanism to cause contaminant migration. The coordinates for this pushes are listed in Table A3-5. Logging, as described in Section A3.1.1.3, will be performed within these pushes.

Direct-pushes will be driven to a maximum depth of 33 m (100 ft), or to refusal. The vertical direct pushes described above will be used to assess the stratigraphy under the landfills and radiological conditions, and to direct future phase soil samples.

Logging data will be collected in HEIS; a summary report also will be prepared by the logging contractor to document the logging activity and results. The logging summary reports will be documented in the field summary report so they can be referenced in the RI report and other documents as necessary.

A3.1.3 Investigation of Potentially Unused Caissons

The following sections describe the intrusive characterization techniques that will be used to investigate caissons that are potentially unused. This investigation will determine if the suspect caissons contain waste, or are in fact empty, as indicated by historical information.

A3.1.3.1 Radiological Surveys

Radiological screening of caisson interiors will be conducted by the radiological control technician or other qualified personnel for evidence of radioactive contamination. A pre-investigation background radiological survey will be performed around the caissons to document the background radiological conditions in the area. Surveys of the caisson interiors will be conducted using standard Hanford Site radiological survey equipment including

Geiger-Mueller[5] counters and/or sodium iodide detectors for beta-gamma emitting radionuclides and portable alpha monitors for alpha-emitting radionuclides. Results of the radiological surveys will be documented on a Radiological Survey Report for each caisson investigated.

Caissons to be investigated include those caissons in the 218-W-4A and 218-W-4B Landfills that are believed to be empty/unused according to available historical documentation. These include the 218-W-4A-C4, 218-W-4A-C6, 218-W-4A-C7, and 218-W-4A-C8 Caissons.

A3.1.3.2 Remote Camera Inspections

Remote camera inspections using a fiber optic camera or an equivalent, in conjunction with adequate lighting equipment, will be performed in conjunction with the radiological surveys described above to investigate those caissons that are believed to be unused based on historical documentation. These techniques will verify that the caissons are free of waste, which will allow administrative closure activities to be performed. Closure activities will include a reclassification in the *Waste Information Data System* database to a "no-action" status.

[5] Geiger-Mueller (radiation counter) is not a trademark.

A4.0 HEALTH AND SAFETY PLAN

All field operations will be performed in accordance with Prime Contractor health and safety requirements outlined in a site-specific health and safety plan. In addition, a work control package will be prepared that will further control site operations. This work package will include an activity hazard analysis, and will reference applicable radiological control requirements.

The sampling processes and associated activities will take into consideration exposure reduction and contamination control techniques that will minimize radiation exposure to the sampling team, as required by minimum requirements established by 10 CFR 835, and provide the basis for consistent and uniform implementation of radiological control requirements.

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A5.0 INVESTIGATION-DERIVED WASTE

No waste is expected to be generated as part of the Phase I-B characterization effort. With the exception of the direct pushes, all of the proposed characterization techniques are minimally invasive and not expected to generate waste. Because the direct pushes do not involve bringing material to the surface, as is the case with conventional drilling techniques, only small quantities of contaminated soil are expected to be generated as part of Phase I-B activities. However, there is the potential for the direct-push rod to become contaminated because of use. This would require decontamination or disposal. In addition, miscellaneous solid waste may be generated from the direct-pushes. This includes gloves, wipes and potentially small quantities of soil, as previously mentioned. In these cases, the waste would be managed in conjunction with an approved waste control plan.

Because offsite laboratories to be used for sample analysis of the organic vapor samplers are licensed to manage and dispose of used sample media, returns from offsite laboratories are not expected.

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A6.0 REFERENCES

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Washington Administrative Code, as amended, Washington State Department of Ecology, Olympia, Washington.

Waste Information Data System Report, Hanford Site database.

APPENDIX B

SUMMARY DESCRIPTIONS AND FIGURES OF WASTE SITES IN THE 200-SW-1 AND 200-SW-2 NONRADIOACTIVE AND RADIOACTIVE LANDFILLS AND DUMPS OPERABLE UNITS

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FIGURES

TABLES

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APPENDIX B

SUMMARY DESCRIPTIONS AND FIGURES OF WASTE SITES IN THE 200-SW-1 AND 200-SW-2 NONRADIOACTIVE AND RADIOACTIVE LANDFILLS AND DUMPS OPERABLE UNITS

The tables in this appendix contain descriptions of the 24 landfills within the 200-SW-2 Radioactive Landfills and Dumps Operable Unit (OU) that were considered during the data quality objectives (DQO) process for this remedial investigation/feasibility study work plan (Table B-1), as well as the 600 Area landfills (Nonradioactive Dangerous Waste Landfill [NRDWL] and 600 Central Landfill [600 CL] [Solid Waste Landfill]).

Table B-2 shows descriptions for fifteen 200-SW-1 Nonradioactive Landfills and Dumps OU and 200-SW-2 OU waste sites. These waste sites are included because they are co-located within, or are close to, the twenty-four 200-SW-2 OU landfills that were considered in the Phase I-B DQO process. Contamination potentially remaining from these sites may be located within in-scope landfills. It should be noted that 13 of the 15 waste sites are "consolidated" within 200-SW-2 OU landfills and will be remediated with the landfill, one waste site is classified as "rejected," and one as "no action." Those classified as "rejected" or "no action" do not require any further remediation.

The information given in the tables is as follows:

- **Site Code:** Identifying code assigned to the waste site by the *Waste Information Data System* database
- **OU:** Operable unit in which the site resides
- **Site Name:** Name(s), and aliases if any, by which the site is known
- **Location:** General description of where the site is located relative to better-known Hanford Site landmarks
- **Dates of Operation:** Dates the site actively received waste
- **Source Facility:** Facility generating the waste
- **Contaminant Inventory/Volume Released:** Amount and type of waste inventory
- **Depth:** Maximum depth and/or height of waste site
- **Waste Site Dimensions:** Area of waste site in terms of length and width
- **General Description:** Description of the waste site, what it contains, whether waste is on the surface or buried, whether any special structures exist, and whether any special history or stabilization notes or other pertinent information exists.

Figures B-1 through B-18 depict the 24 landfills in the scope of the 200-SW-2 OU. Figure B-19 depicts the NRDWL and 600 CL Landfills in the 200-SW-1 OU.

Figure B-1. 218-C-9 Landfill.

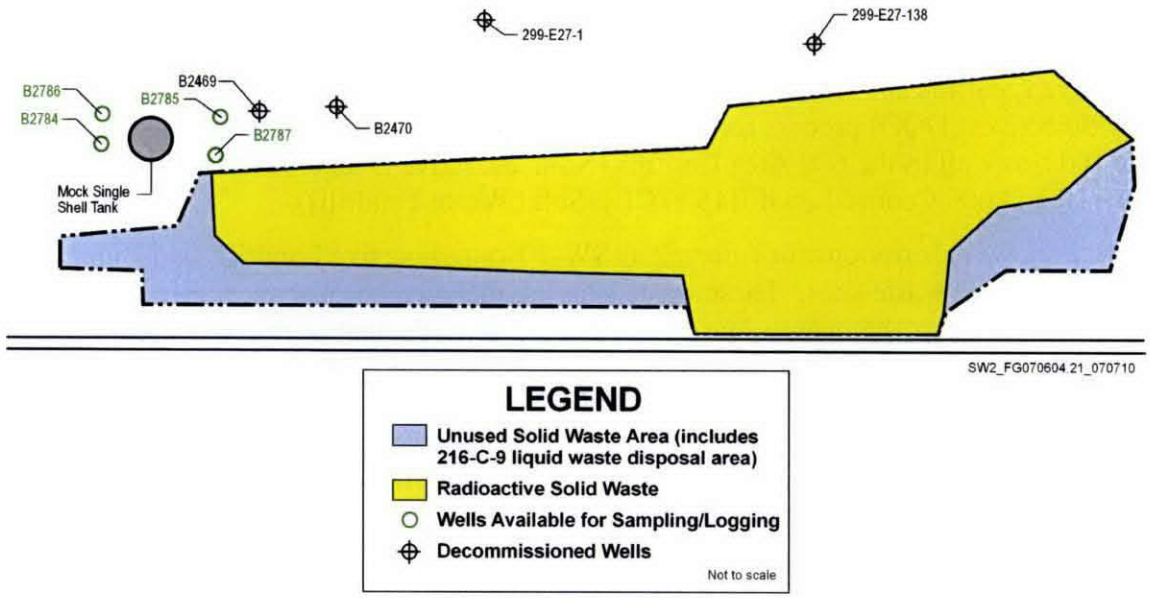

Figure B-2. 218-E-1 Landfill.
(No wells within 50 m.)

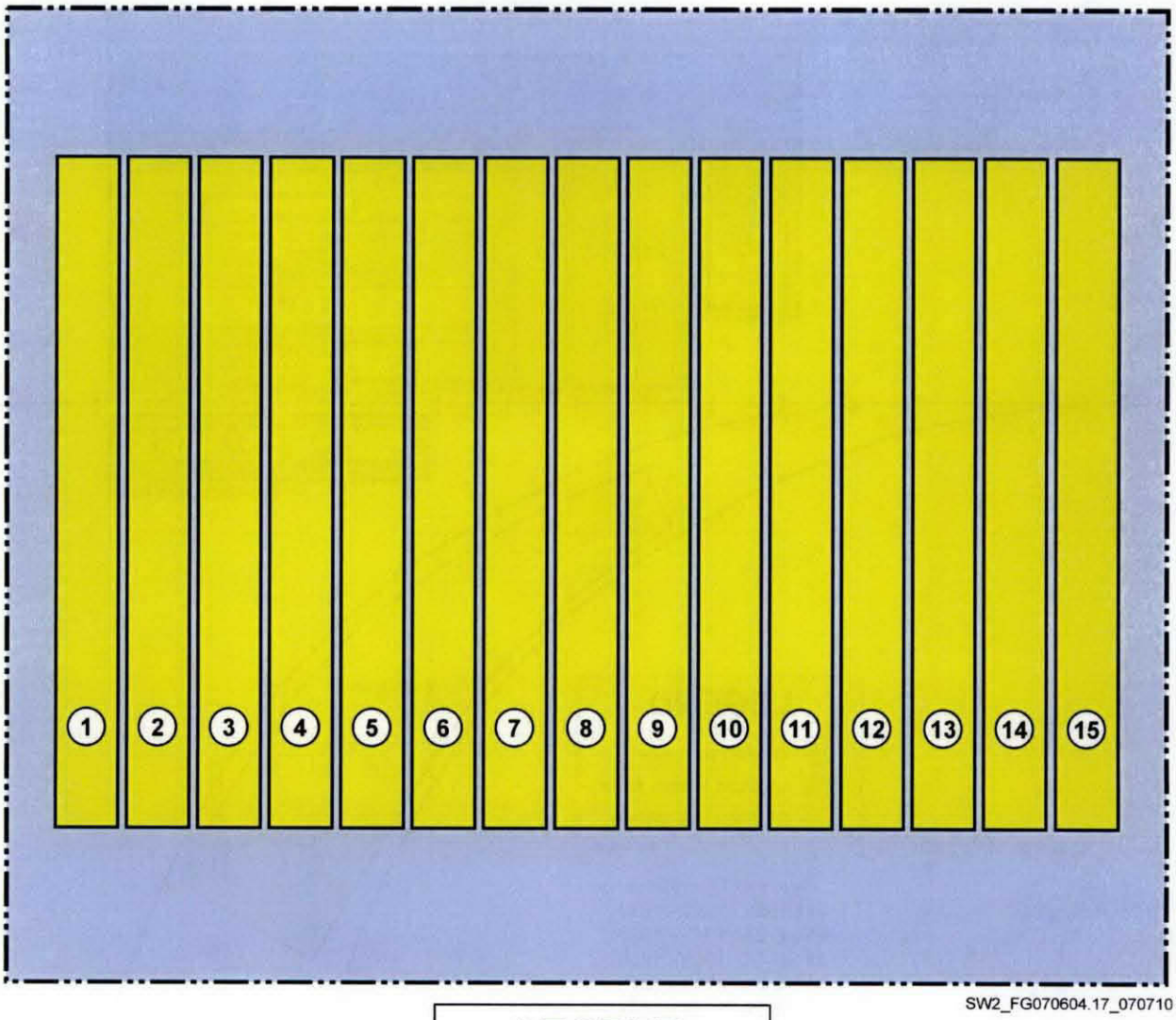

Figure B-3. 218-E-2, -2A, -4, -5, -5A, and -9 Landfills.
(No wells within 50 m.)

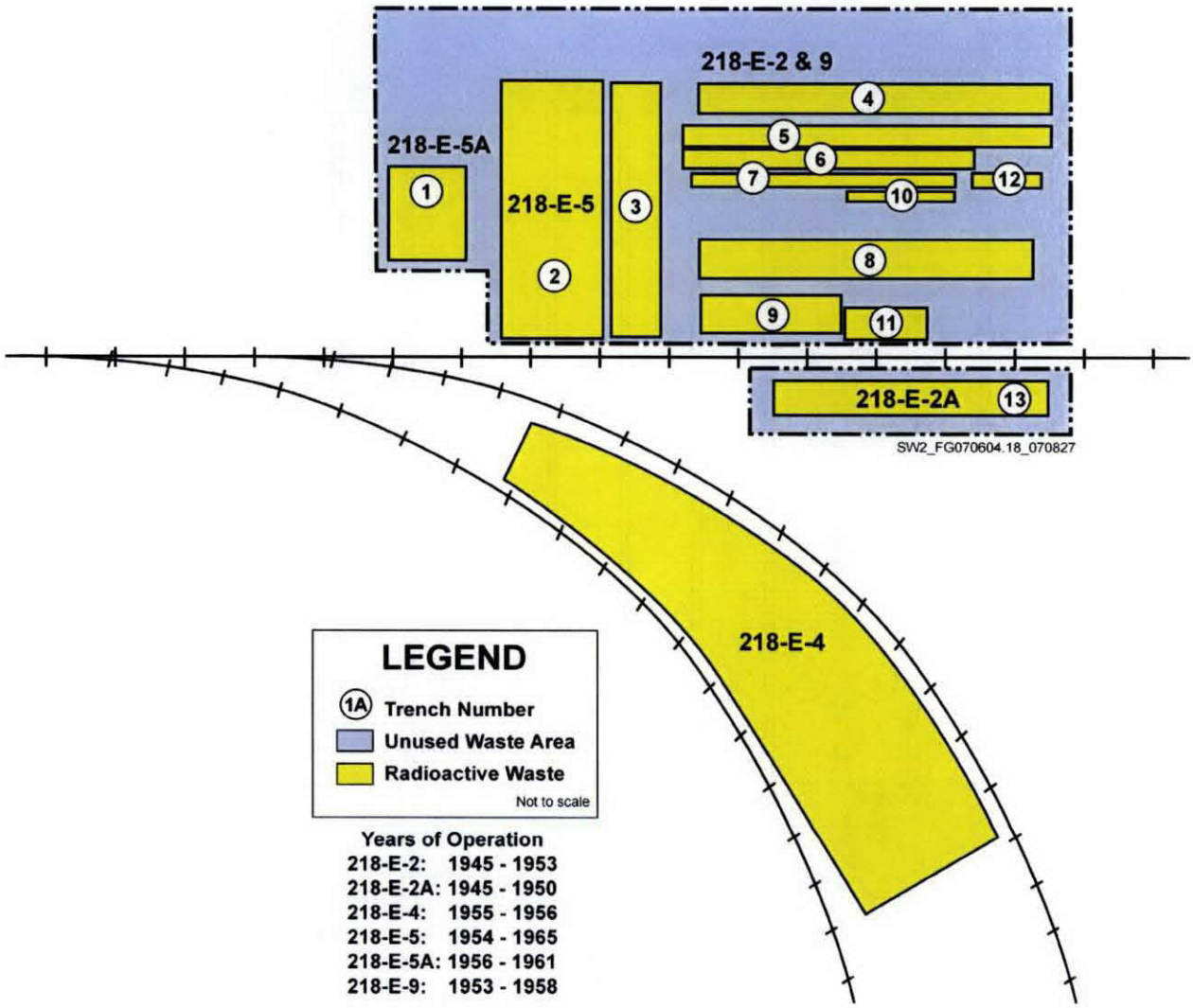

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Figure B-4. 218-E-10 Landfill.

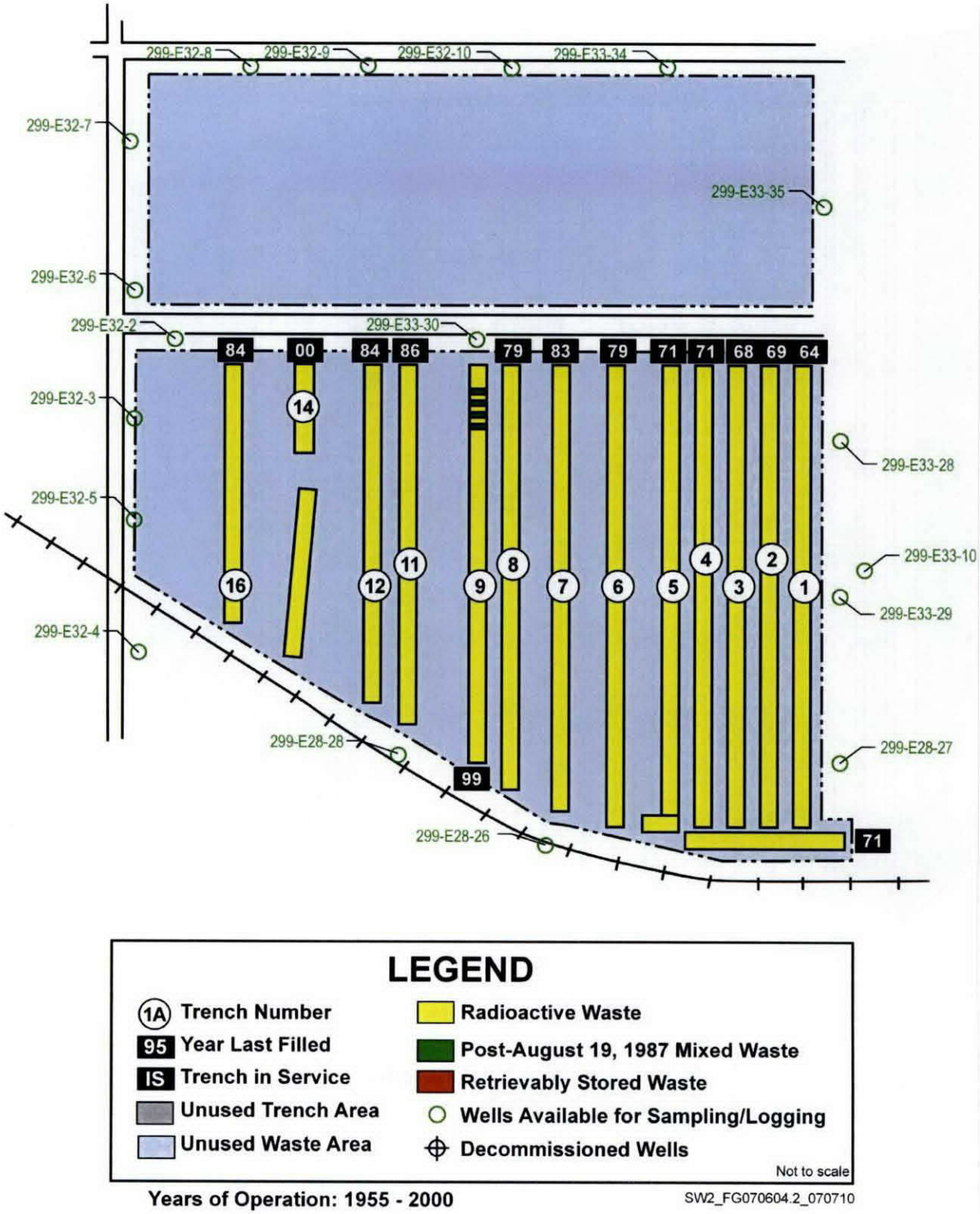

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Figure B-5. 218-E-12A Landfill.

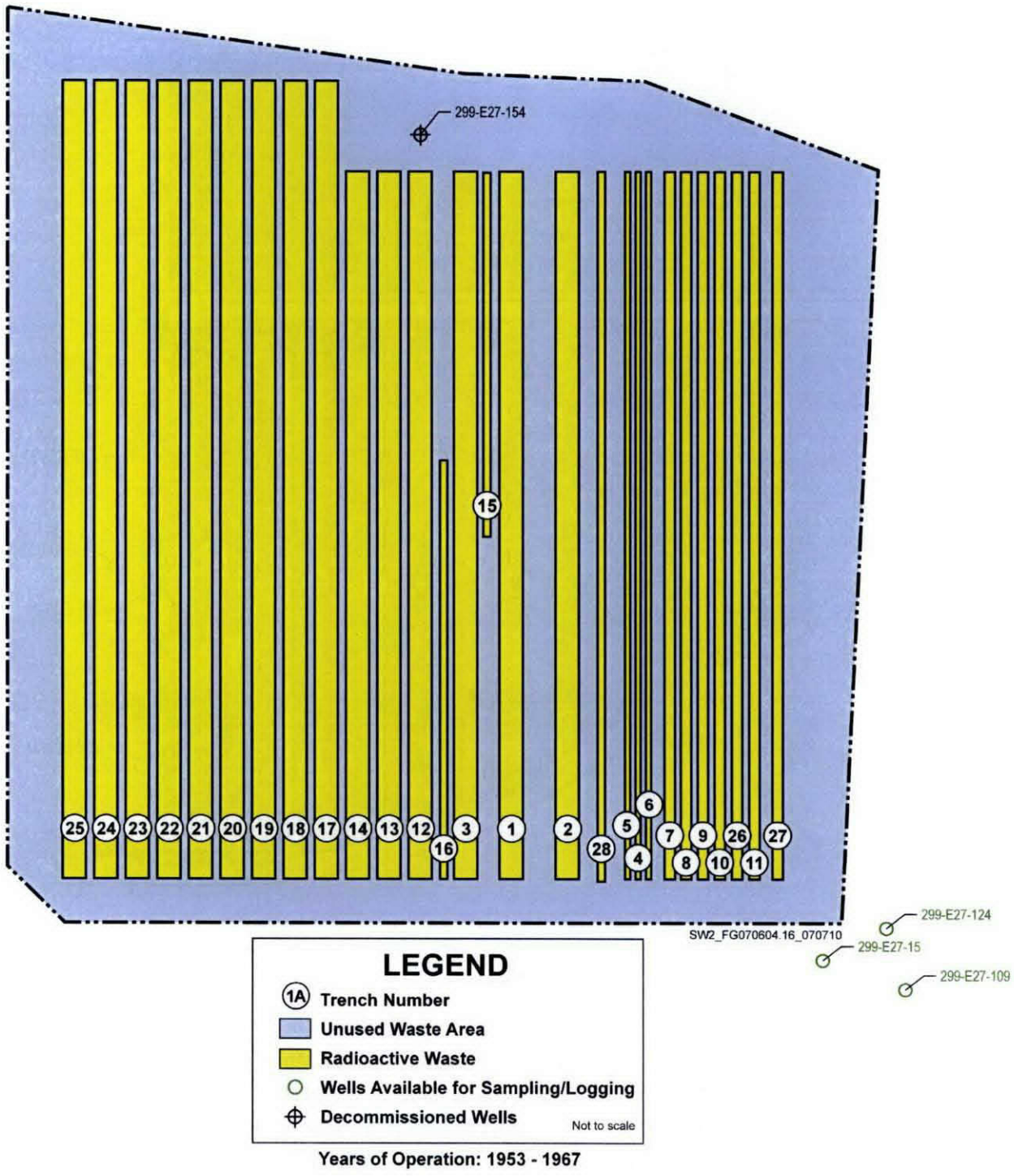

Figure B-6. 218-E-12B and 218-E-8 Landfills.

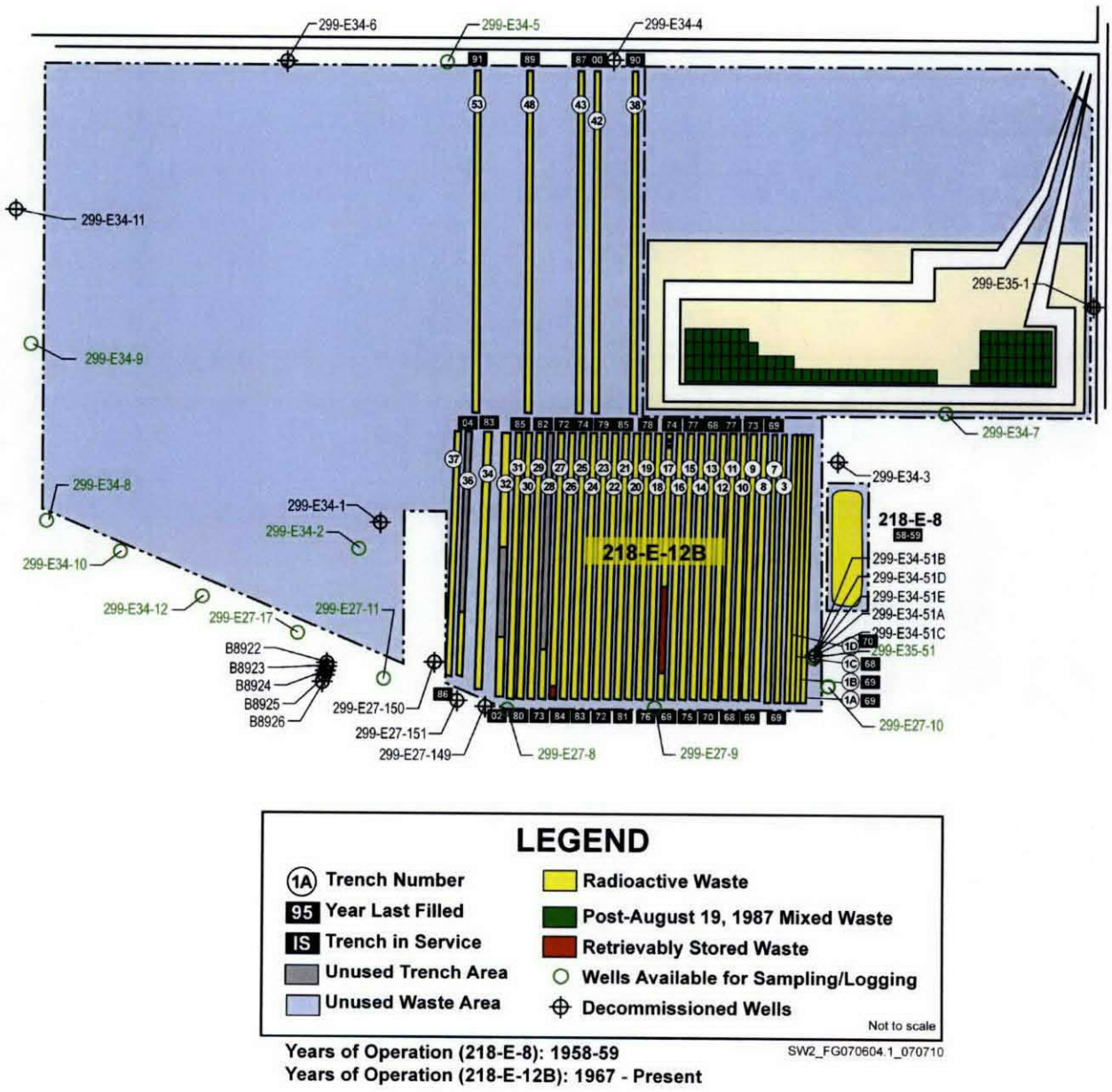

Figure B-7. 218-W-1 Landfill.
(No wells within 50 m.)

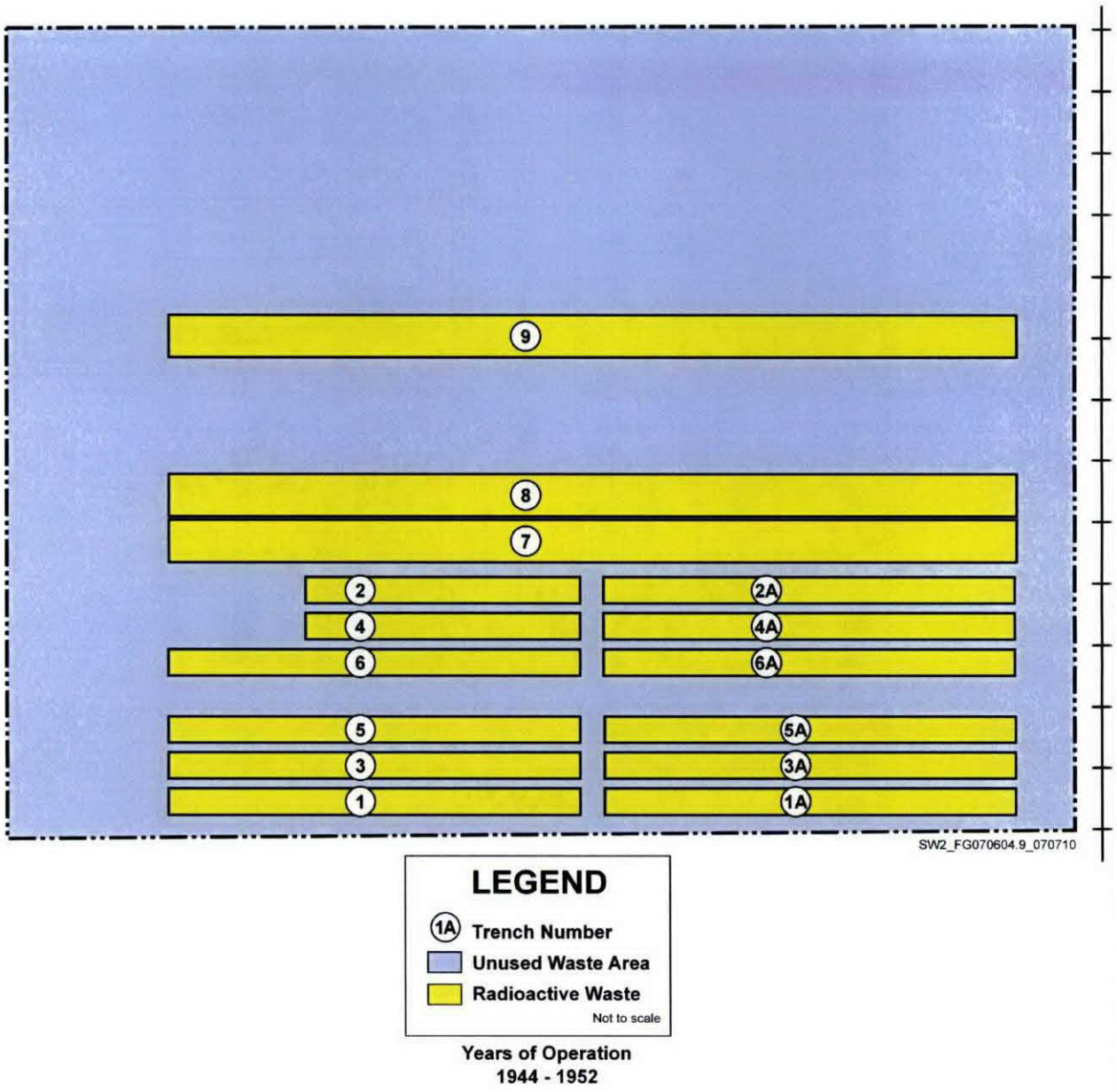

Figure B-8. 218-W-1A Landfill.

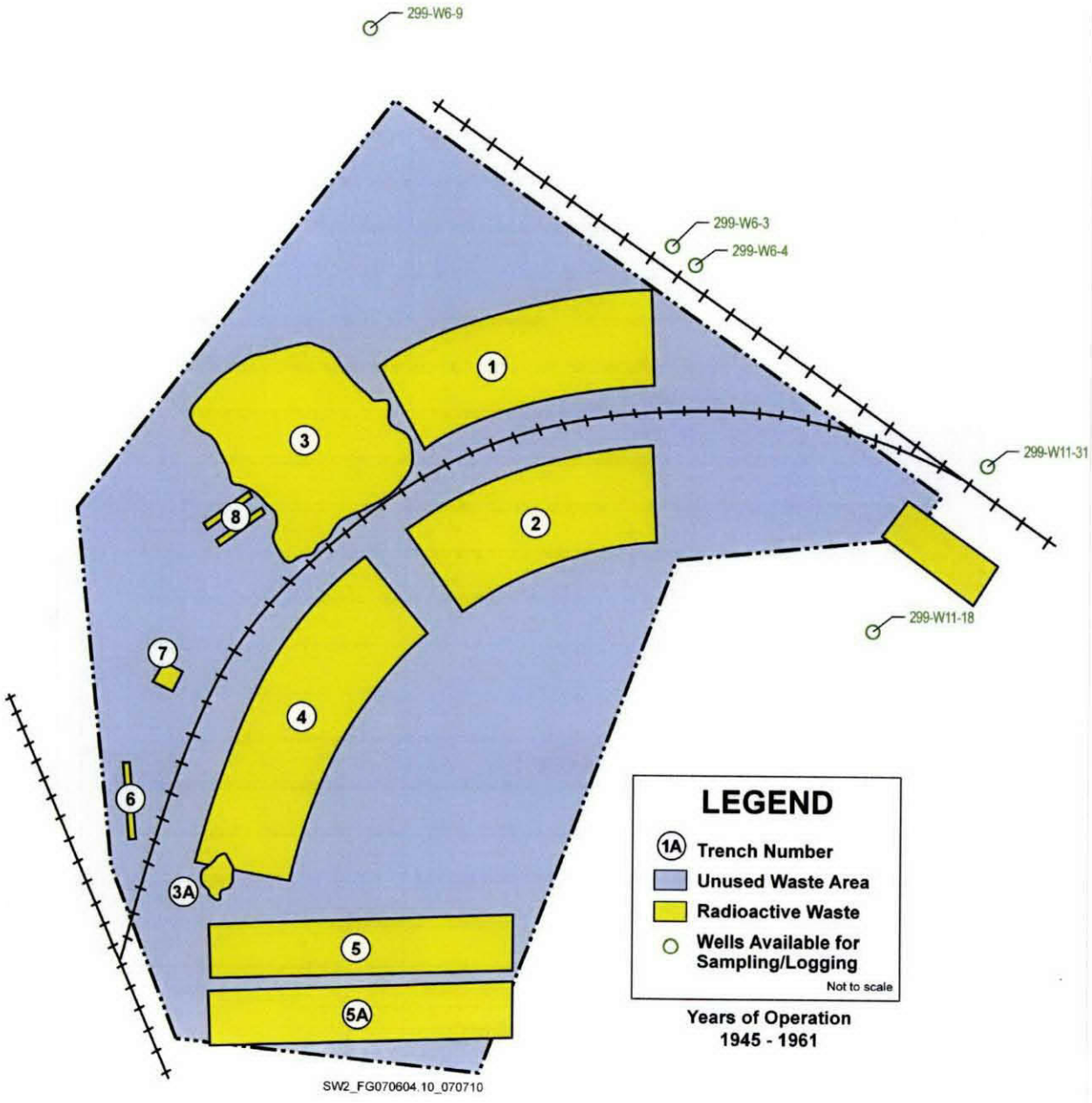

Figure B-9. 218-W-2 Landfill.

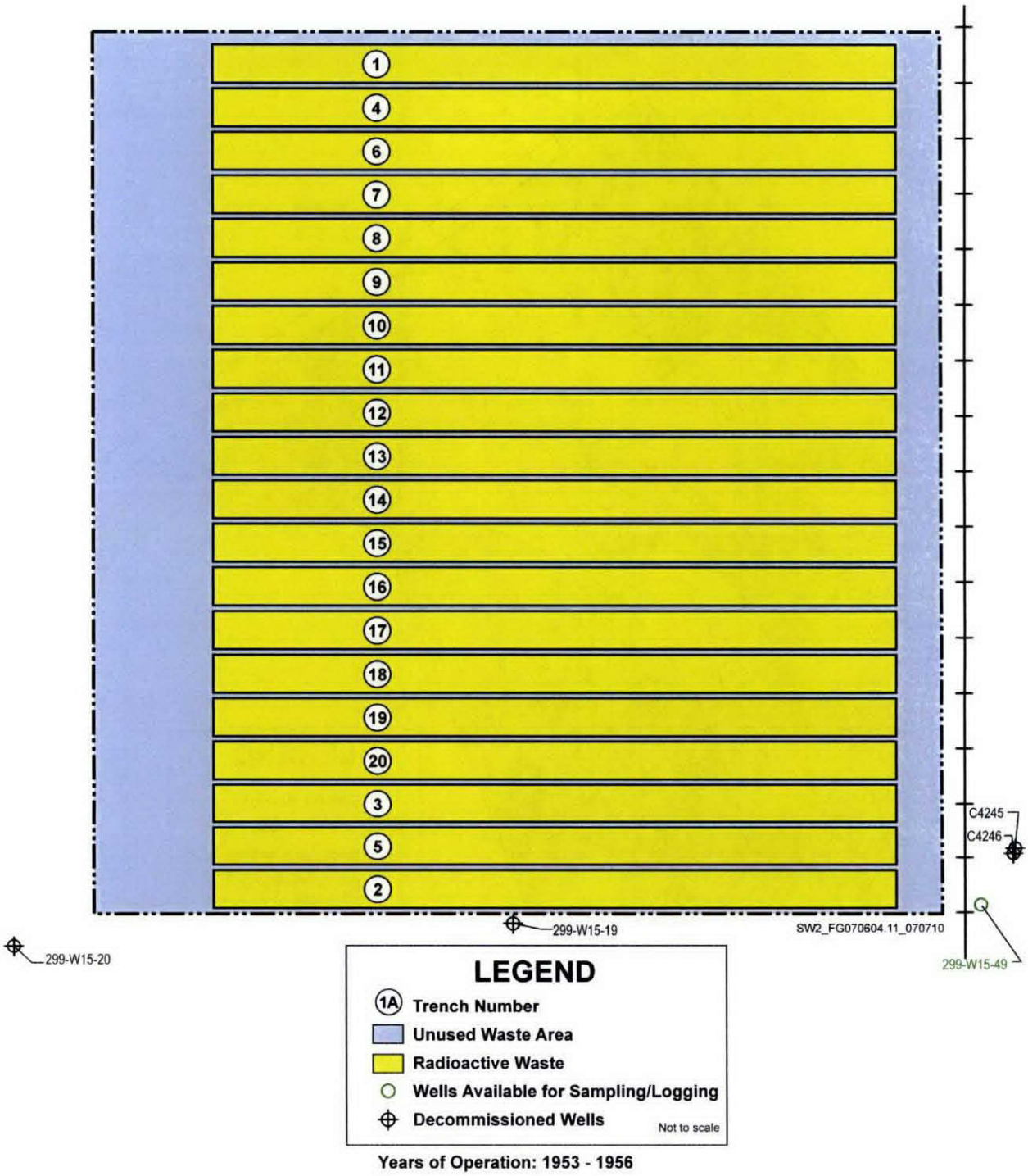

Figure B-10. 218-W-2A Landfill.

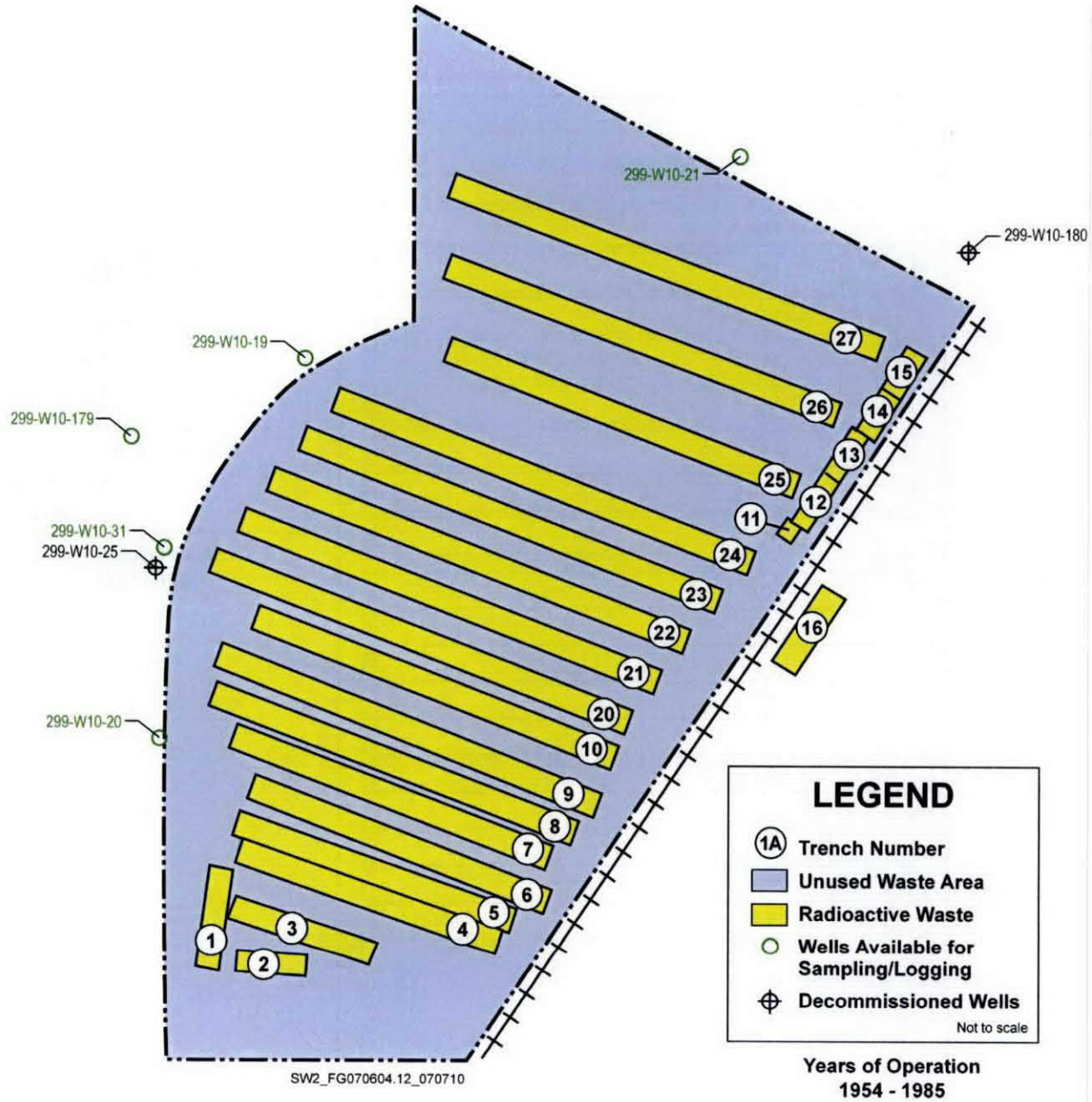

Figure B-11. 218-W-3 Landfill.

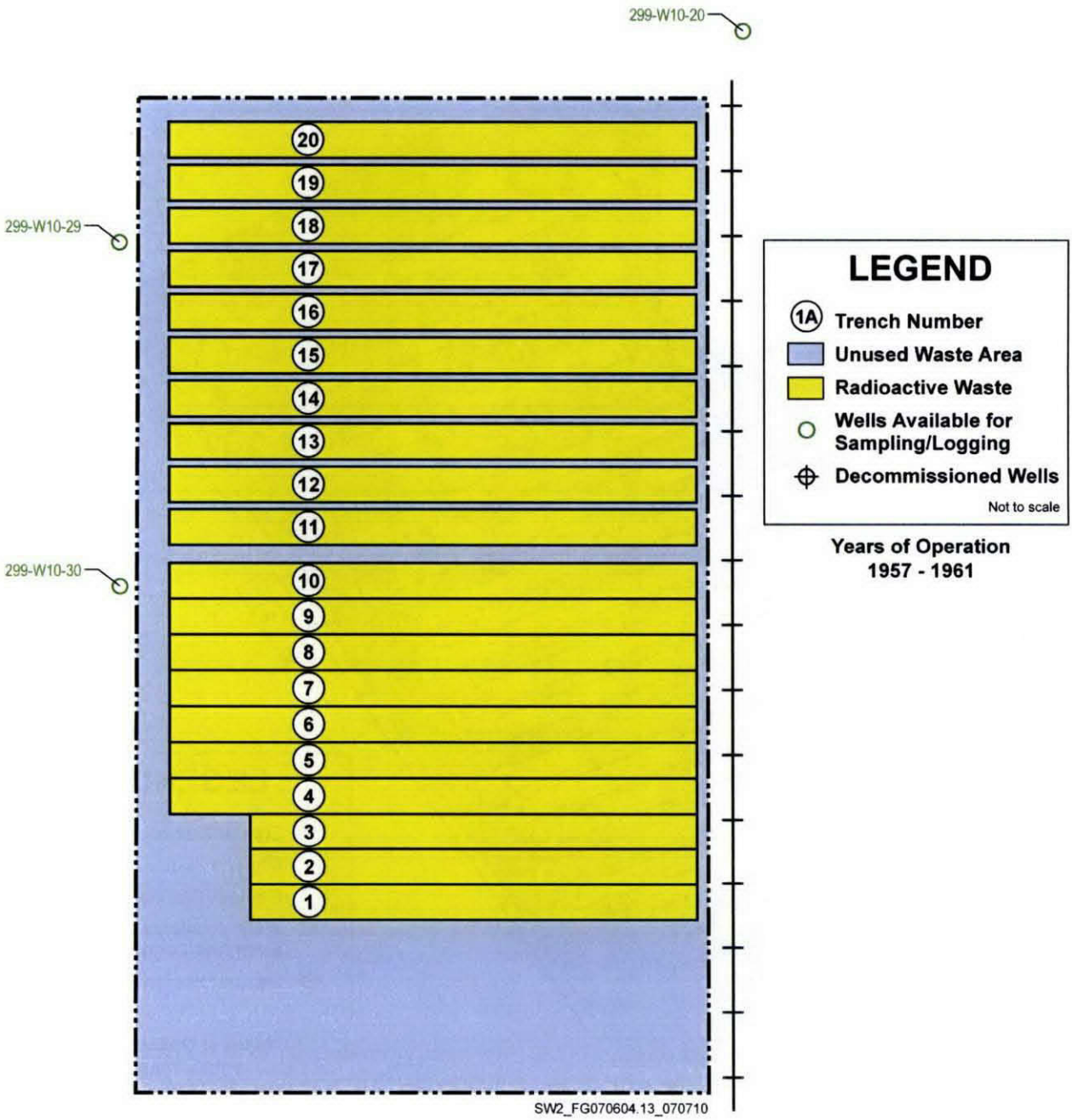

Figure B-12. 218-W-3A Landfill.

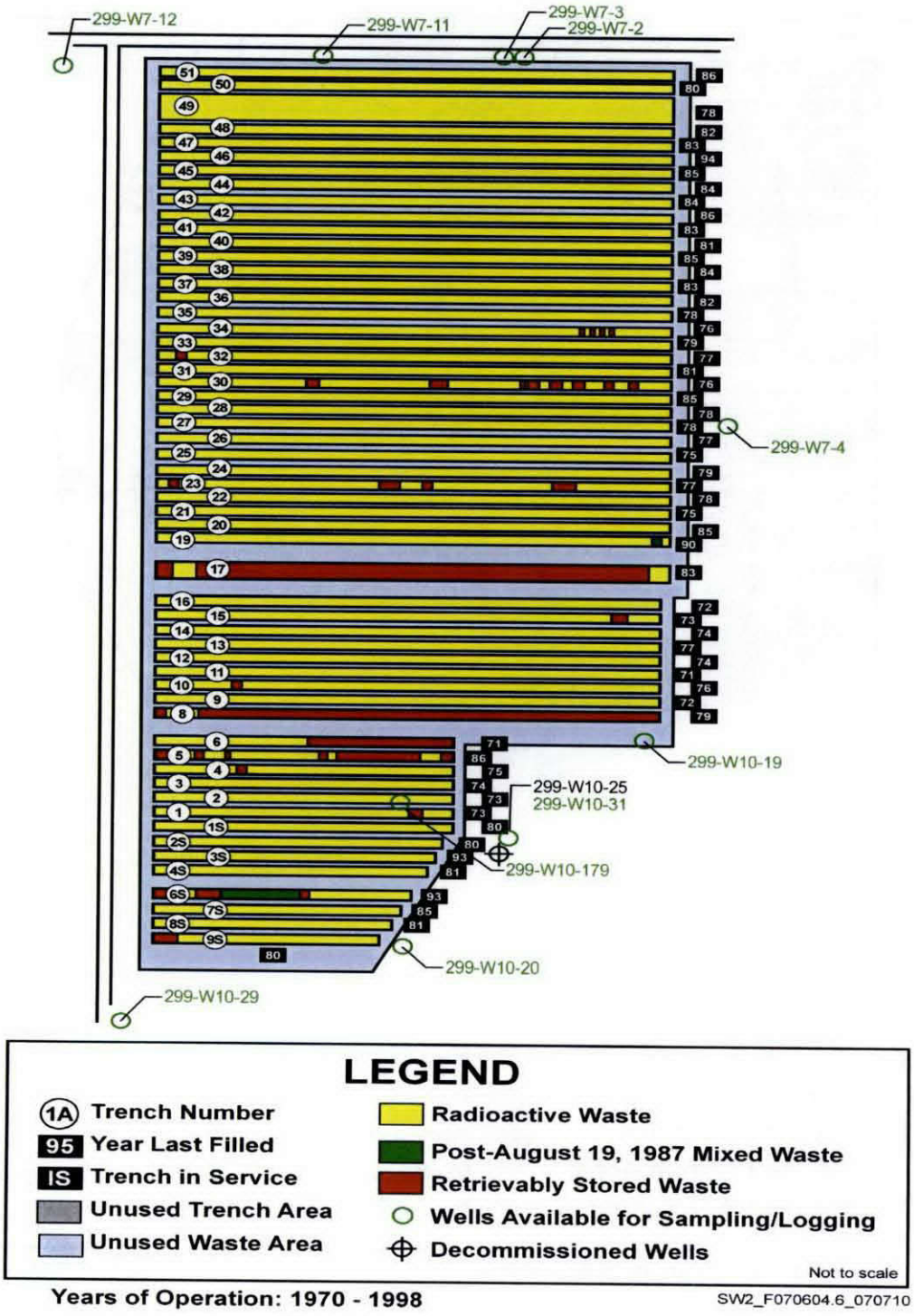

Figure B-13. 218-W-3AE Landfill.

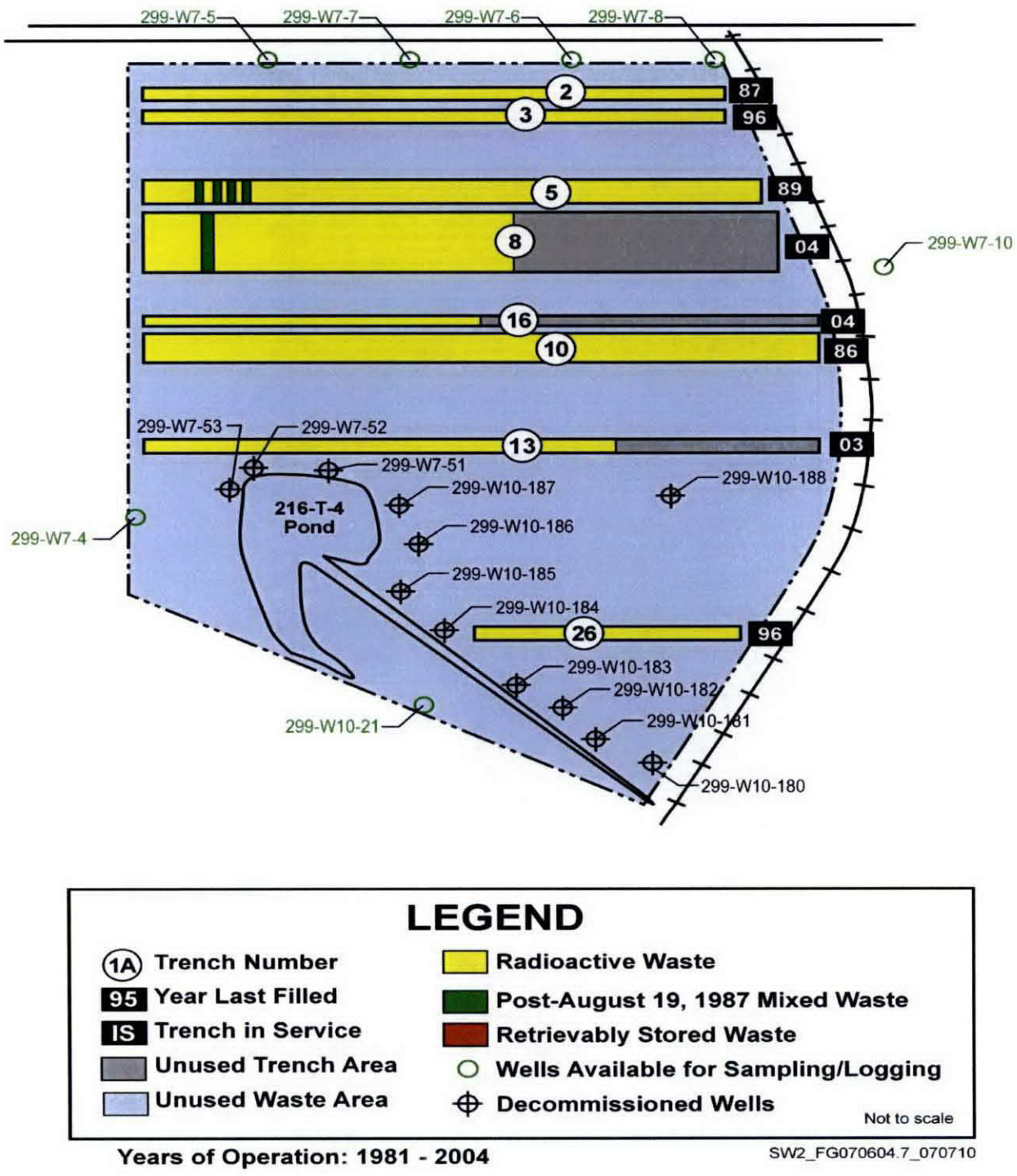

Figure B-14. 218-W-4A Landfill.

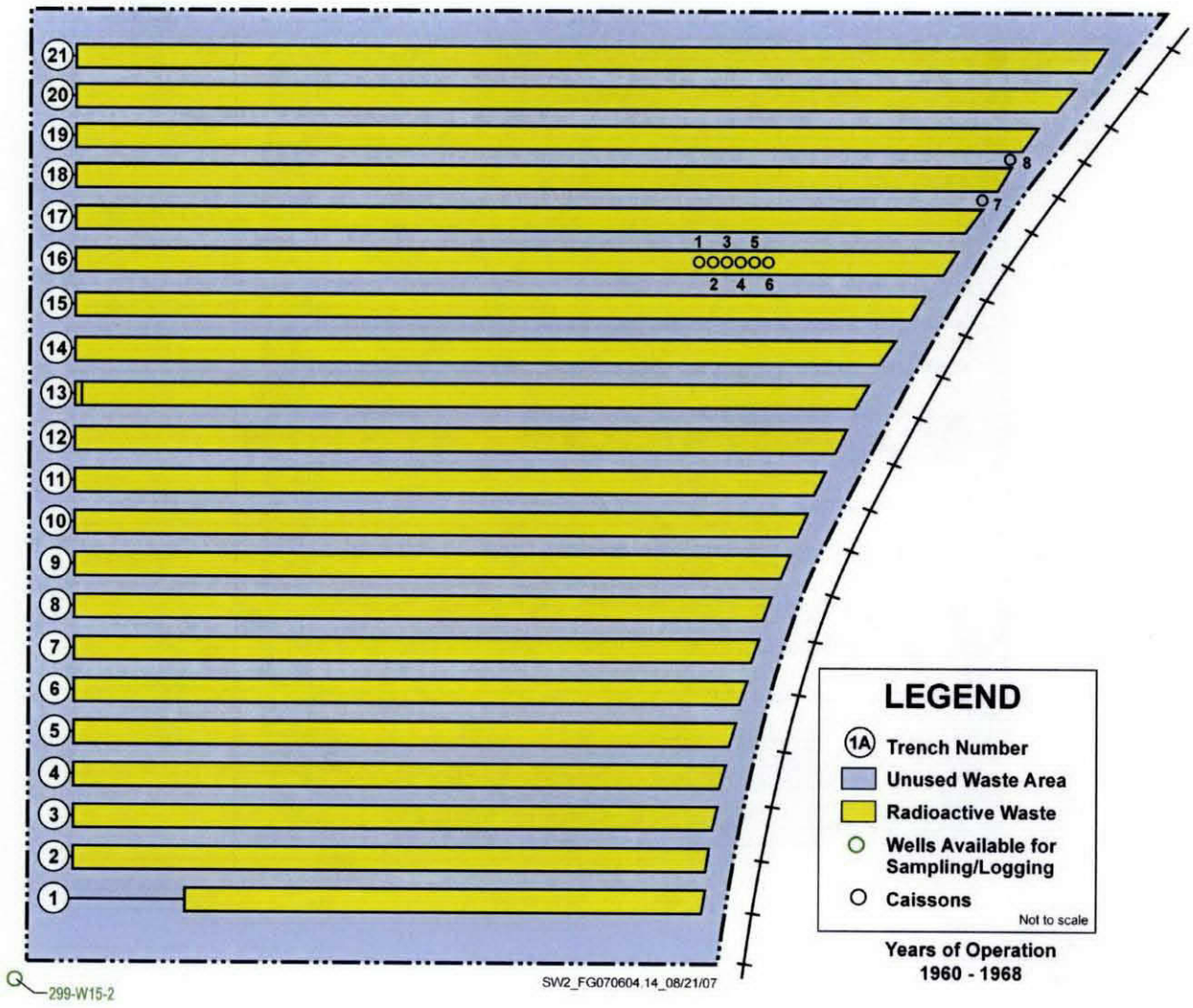

Figure B-15. 218-W-4B Landfill.

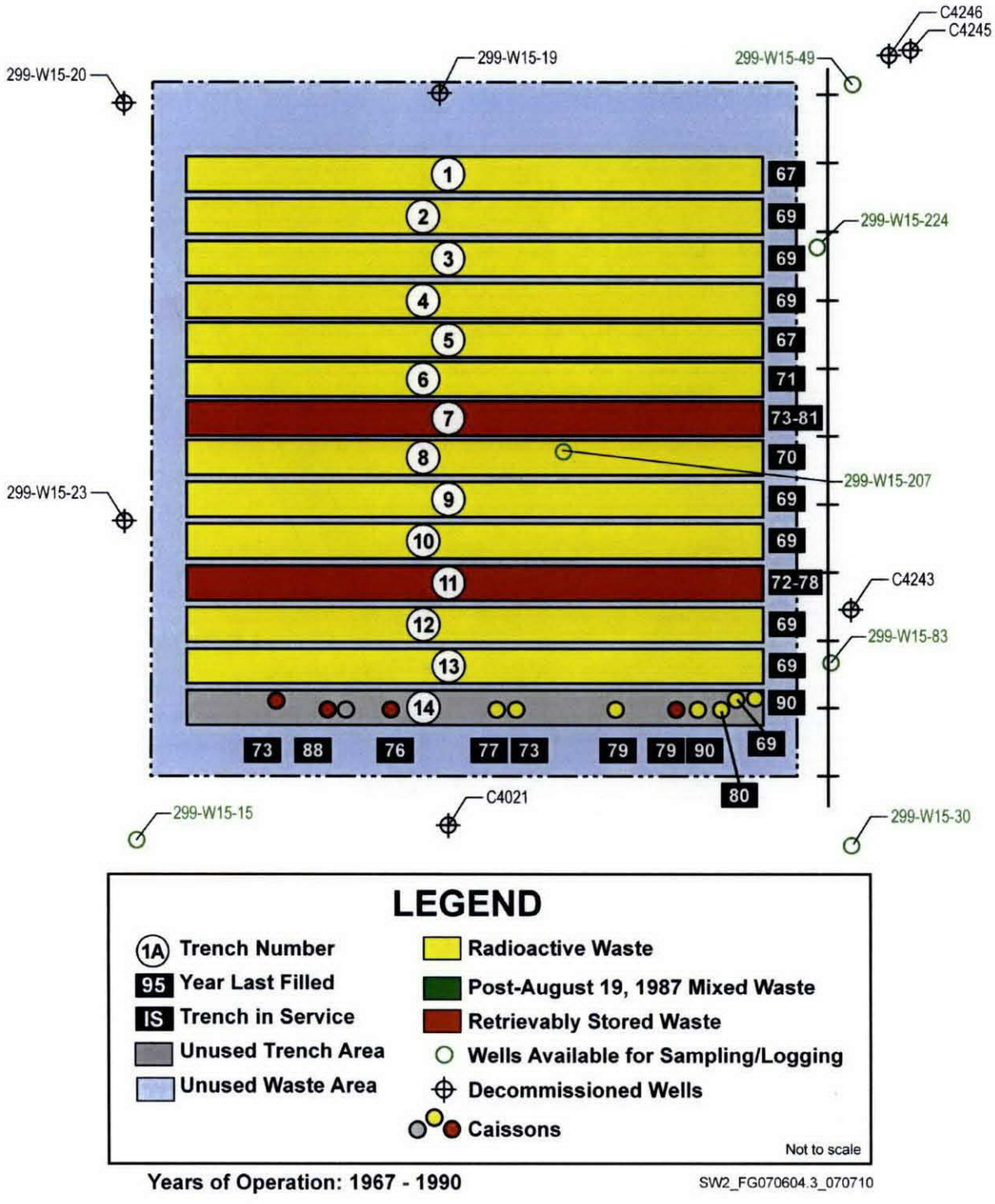

Figure B-16. 218-W-4C Landfill.

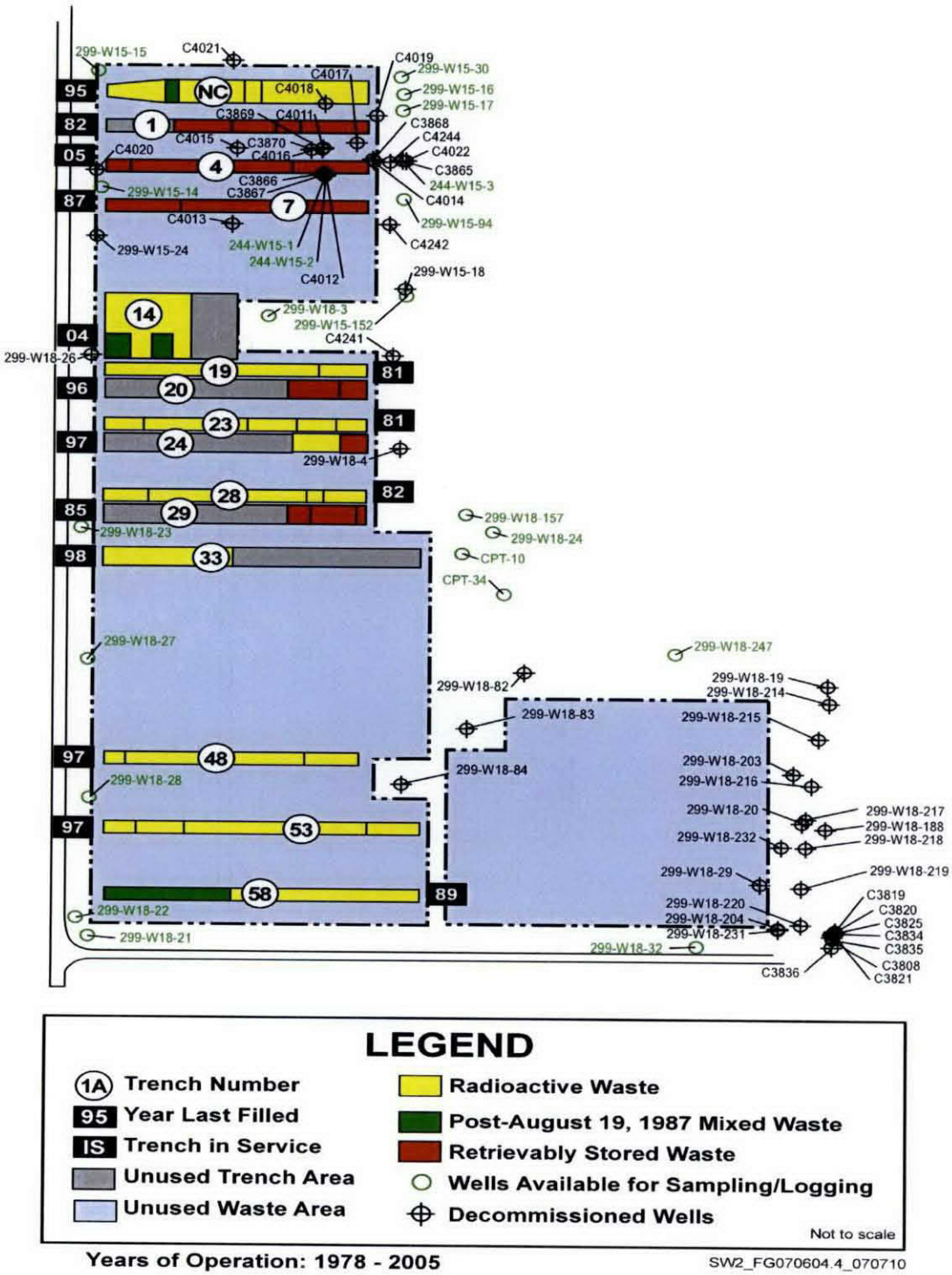

Figure B-17. 218-W-5 Landfill.

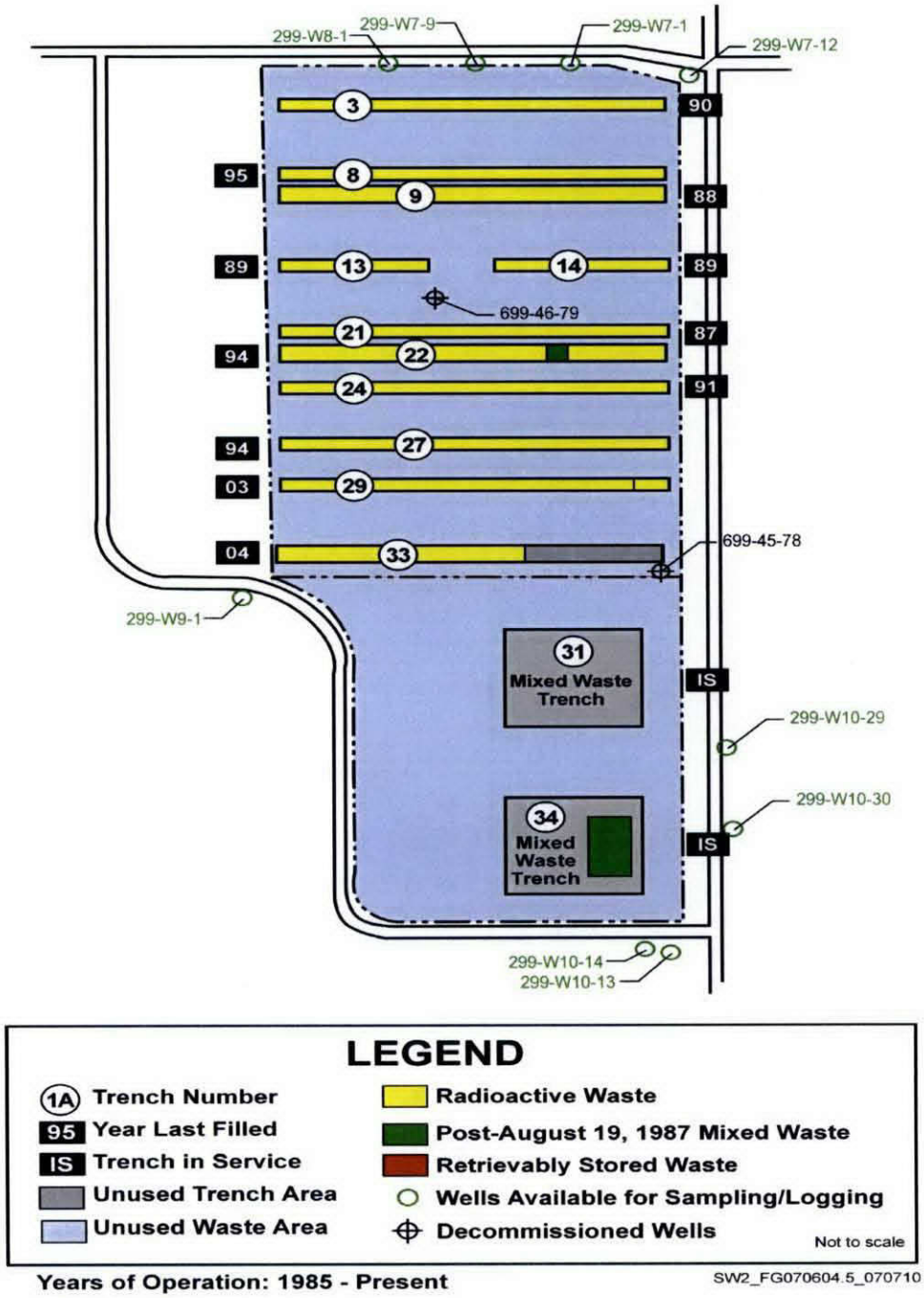

Figure B-18. 218-W-11 Landfill.

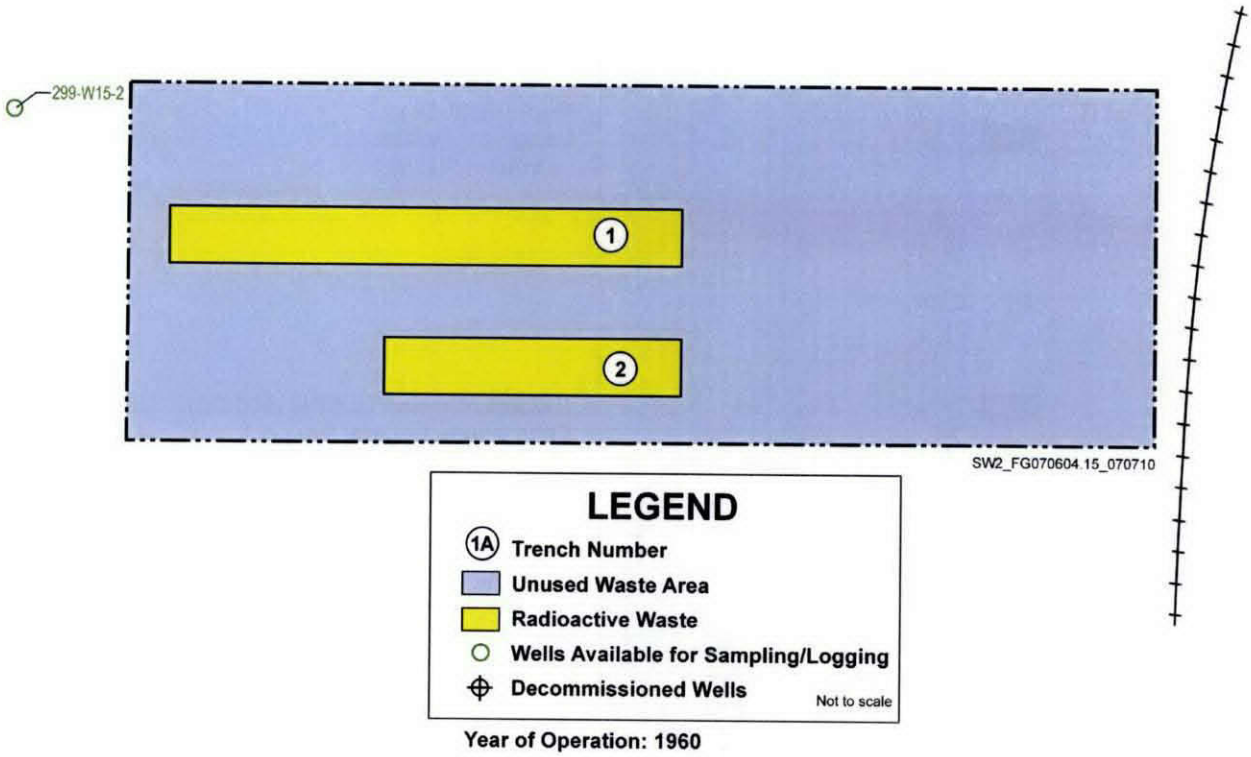

Figure B-19. Nonradioactive Dangerous Waste Landfill and 600 Central Landfill (Solid Waste Landfill).

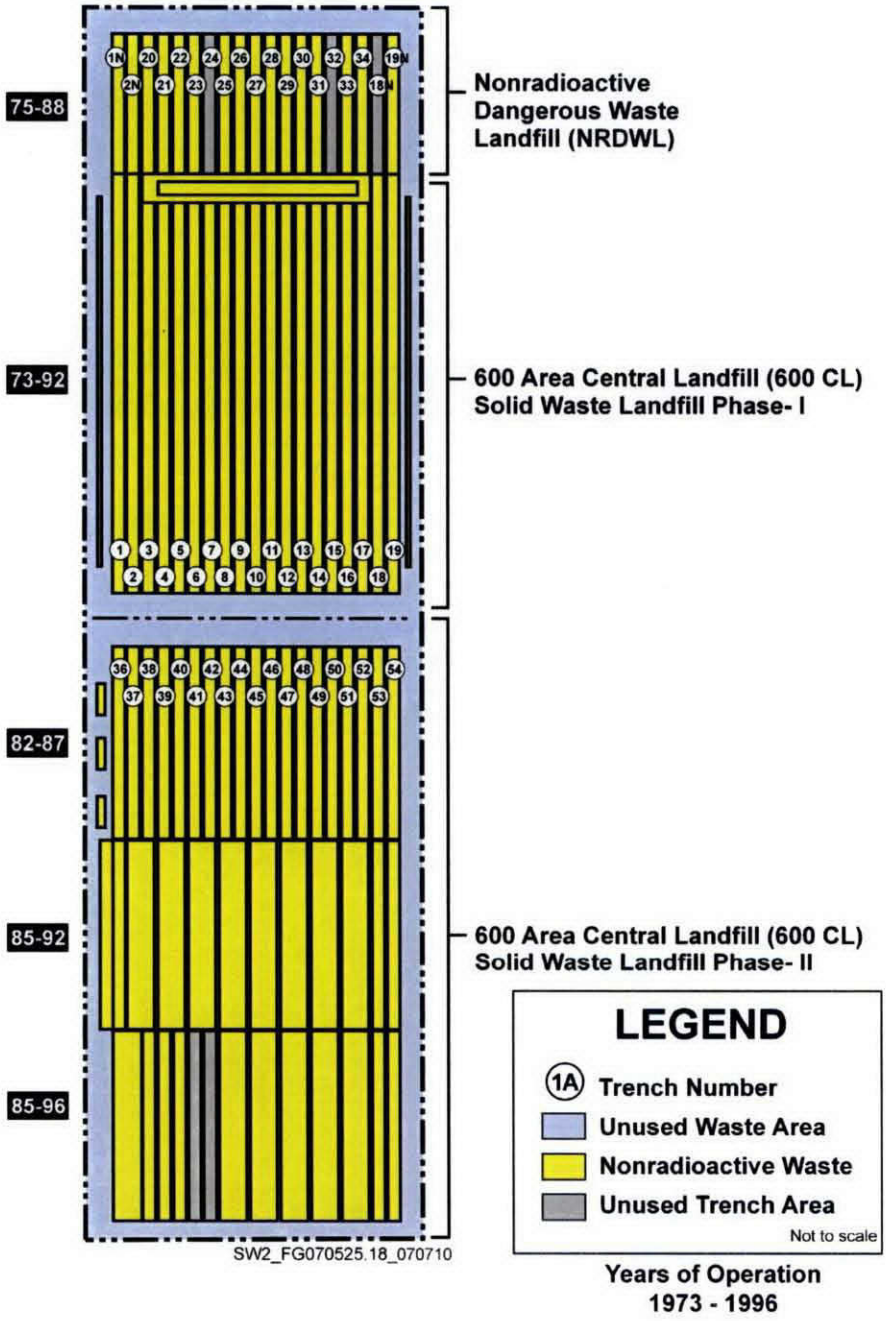

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
600 CL	200-SW-1 Past-Practice	600 CL, 600 Area Central Landfill, Central Landfill, Central Waste Landfill, CWL, Solid Waste Landfill, SWL, 671	Southeast of 200 East Area on Army Loop Road (south of Route 4 South)	1973 to 1996	N/A	596,000 m^3 (780,000 yd^3) miscellaneous solid debris. 600 CL also received up to 5,000,000 L (1,320,000 gal) of sewage and 380,000 L (100,000 gal) of garage wash water. The site does not contain radioactive wastes.	294 by 907 m (965 by 2,976 ft)	The site consists of 39 unlined solid waste trenches and 5 unlined liquid disposal trenches. All the trenches have been backfilled and are enclosed by an 8-ft fence with lockable gates. The landfill was developed in phases. In 1973, the first trench (JA Jones Trench) accepted sanitary waste, construction and demolition debris, asbestos, and liquid waste. In 1975, the northern 10 acres (NRDWL, or Trenches 1N, 2N, 18N, 19N, and 20-34) were isolated for disposal of asbestos and nonradioactive chemical waste. Phase II expanded the landfill south, and Trenches 36 through 54 received liquid sewage and 1100 Area catch tank liquids. From 1982 to 1987, sewage was placed in three additional trenches to the west. After 1987, liquid waste no longer was accepted, and since March 1996 all sanitary wastes have been sent to the City of Richland Landfill. Inspections are performed quarterly using a monitoring system consisting of a large basin and lysimeter. Leachate was noticed in July 1996 and initially collected at a rate of 10 gal/wk. The leachate is sampled and disposed of at the 300 Area Treated Effluent Disposal Facility. Routine gas and groundwater monitoring also are conducted. Before 1982, detailed logbooks were not maintained and chemicals disposed were not recorded. It is estimated that 40% (vol) of the waste is paper, 10% is asbestos, and 1% to 5% are sewage and 1100 Area catch basin wastes. The remainder of the waste is miscellaneous office and construction debris, bulky containers, medical wastes, appliances, furniture, and chemicals.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
600 NRDWL	200-SW-1 TSD	600 NRDWL, 600 Area Nonradioactive Dangerous Waste Landfill, NRDW Landfill, Nonradioactive Dangerous Waste Landfill (Central Landfill), NRDWL	Southwest of the intersection with Route 4 South and southeast of the 200 East Area on Army Loop Road	1975 to 1985	Various Hanford Site operations/ processes	Laboratory chemicals, solvents, waste paints, oils, and empty containers; miscellaneous solid debris. The site does not contain radioactive wastes.	Typical trench length and width is 122 by 5 m (400 by 16 ft)	The site is a RCRA TSD unit. The landfill consists of 19 unlined trenches that are all backfilled. Wastes containing components that are currently regulated by Washington State as dangerous waste were disposed to this site before August 19, 1987. These wastes were generated from various process operations, research laboratories, maintenance activities, and transportation functions throughout the Hanford Site. Trenches 18N, 24, and 32 never were used. In March 2001, the average conductance value for groundwater exceeded the critical mean value in wells 699-25-34A&B (CCN 089215). No free liquids have been disposed in the landfill. All liquids disposed were containerized. Quarterly radiation surveys and groundwater monitoring are conducted. In 1993 and 1997, soil gas surveys were performed and various VOCs were detected in each event (WHC-SD-EN-TI-199).
218-C-9	200-SW-2 Past-Practice	218-C-9, Dry Waste No. 0C9, 218-C-9 Landfill	North of 7th St and north of Hot Semiworks Plant	Liquid discharges 1953 to 1983. Solid waste burial 1985 to 1989	Hot Semiworks (201-C) demolition	1 billion L (264 million gal) mildly radioactive steam condensate liquid discharge 7,580 m^3 (9,920 yd^3) of miscellaneous solid debris and soil. The site contains LLW only. The site contains no Pu, and less than a milligram of U.	76 by 66 m (251 by 217 ft)	The burial pit is located at the site of the dried 216-C-9 Pond. SWITS and paper burial records indicate other burials outside the pit area. The dried pond was covered with a layer of washed gravel, and material from the deactivation and demolition material of the Hot Semiworks Plant was disposed. In August 1986, a fire was discovered in the burial pit. It was determined that metal frames cut with a torch had been placed in the pit before fully cooling and ignited flammable material. The entire site has been backfilled and surface stabilized. A routine radiological survey is performed annually. Debris at the site consists of radiologically contaminated concrete rubble, large equipment, roofing material, metal scrap, and other Hot Semiworks Plant demolition wastes. Contaminated soil from UN-216-E-37 and UN-216-E-39 also was placed in the pit.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-E-1	200-SW-2 Past-Practice	218-E-1, 200 East Dry Waste No. 001	West of PUREX (202-A Building) and south of 4th St	1945 to 1953	200 East Area – believed to be mainly B Plant wastes	3,030 m^3 (2,317 yd^3) dry waste. The site contains unsegregated waste only. 0.9 kg Pu, 400 kg U.	148 by 88 m (486 by 290 ft)	The landfill consists of 15 north-to-south trenches 61 m (200 ft) long, ranging from 5 to 6 m (16 to 20 ft) wide. In 1974, areas with surface depressions were filled to grade with cinders from the 284-E Powerhouse and topped with gravel. In October 1978, an area of previously buried waste was uncovered at the south end of a trench. The contamination was reburied and covered with clean soil. The entire landfill was surface stabilized with 46 cm (18 in.) of clean soil and vegetated with wheat grass.
218-E-2	200-SW-2 Past-Practice	218-E-2, 200 East Industrial Waste No. 002, Equipment Landfill #2	North of B Plant and south of BX Tank Farm; co-located with Landfills 218-E-5, 218-E-5A and 218-E-9	1945 to 1953	200 East Area	9,033 m^3 (11,815 yd^3) of industrial wastes. The site contains unsegregated waste only. The site contains 0.8 kg Pu, 300 kg U.	Total site is 165 by 134 m (541 by 441 ft)	The landfill consists of 9 industrial trenches. The unit was surface stabilized in 1979 with 0.3 m (1 ft) of clean backfill material and vegetated with wheat grass. Trench lengths vary from 27 to 142 m (90 to 465 ft). The site is co-located with Landfills 218-E-2A, 218-E-4, 218-E-5, 218-E-5A, and 218-E-9.
218-E-2A	200-SW-2 Past-Practice	218-E-2A, Regulated Equipment Storage Site No. 02A, Burial Trench	North of B Plant and south of 218-E-2. A railroad spur separates 218-E-2 from 218-E-2A	1945 to 1950	Unknown	The site contains unsegregated waste only. Nothing is known about waste volume or inventories.	98 by 14 m (320 by 46 ft)	The site contains a single east-west trench and was used as an above-ground storage site for contaminated equipment. There are no records or inventories for this site. A 1978 inspection noted a number of sinkholes. During 1979, several loads of soil were placed over the sinkholes, and the stored above-ground equipment was buried in the 218-E-10 Landfill. The site was surface stabilized with 0.3 m (1 ft) of soil, revegetated, and posted/marked as an underground radioactive material area in 1980 to 1981. The site is co-located with Landfills 218-E-2, 218-E-4, 218-E-5, 218-E-5A, and 218-E-9.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-E-4	200-SW-2 Past-Practice	218-E-4, 200 East Minor Construction No. 4, Equipment Landfill #4	Irregularly shaped polygon located between two railroad tracks and north of 221-B Building	1955 to 1956	200 East Area – (B Plant [221-B] construction and modifications)	1,586 m^3 (2,074 yd^3) of mainly construction debris. The site contains .01 kg Pu, 1 kg U. All waste is unsegregated.	238m by 61 m (780 by 200 ft)	The site received repair and construction waste from the 221-B modifications. The exact number of trenches remains unknown. It is believed that two trenches run parallel to the railroad tracks. In June 1960, UPR-200-E-23 occurred and contaminated the area to a maximum reading of 1 rad/h. The site was surface stabilized in 1980 and is posted as Underground Radioactive Material. A radioactive survey is performed annually. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-5, 218-E-5A, and 218-E-9.
218-E-5	200-SW-2 Past-Practice	218-E-5, 200 East Industrial Waste No. 05, Equipment Landfill #5	North of B Plant and southwest of BX Tank Farm, adjacent to 218-E-2 Landfill	1954 to 1956	200 East Area – PUREX (202-A)	3,172 m^3 (4,149 yd^3) of miscellaneous debris. The site contains unsegregated waste only. The site contains 0.62 kg Pu, 120 kg U.	102 by 63 m (335 by 207 ft)	The site contains two areas of trenches. One area is 104 m (341 ft) long by 40 m (131 ft) wide and contains multiple narrow trenches that received industrial dry waste and small boxes. The second area is a single trench oriented north/south that is 102 m (335 ft) long by 20 m (64 ft) wide. This trench contains railroad boxcars contaminated by uranyl nitrate hexahydrate at the north end. The burial areas were stabilized and covered with 0.3 m (1 ft) of clean soil in 1980. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-4, 218-E-5A, and 218-E-9.
218-E-5A	200-SW-2 Past-Practice	218-E-5A, 200 East Industrial Waste No. 005A, Equipment Landfill #5A	North of B Plant and southwest of BX Tank Farm, adjacent to the 218-E-5 Landfill	1956 to 1959	200 East Area – PUREX (202-A)	6,173 m^3 (8,740 yd^3) of PUREX failed equipment. The site contains unsegregated waste only. The site contains 1.38 kg Pu, 120 kg U	37 by 30 m (120 by 100 ft)	Literature indicates that the site is one large burial trench that contains wooden boxes of spent PUREX equipment. The trench was backfilled in 1961. The site was stabilized in 1980, covered with 1 ft of clean backfill, and revegetated. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-4, 218-E-5, and 218-E-9.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-E-8	200-SW-2 Past-Practice	218-E-8, 200 East Construction Landfills	North of the 218-E-12A, on the hillside adjacent to the 218-E-12B Landfill	1958 to 1959	200 East Area – PUREX (202-A and 293-A)	2,265 m^3 (2,963 yd^3) miscellaneous solid construction debris. The site contains unsegregated waste only. The site contains 0.02 kg Pu, 2 kg U	122 by 35 m (400 by 115 ft)	The site consists of an unknown number of trenches. In 1979, contaminated tumbleweed fragments were found that had blown in and accumulated inside the site and along the west boundary. The trenches were backfilled, and the site was surface stabilized in 1980. An annual radiological survey is performed. Debris included construction and repair wastes from the 293-A Building and the PUREX crane addition.
218-E-9	200-SW-2 Past-Practice	218-E-9, 200 East Regulated Equipment Storage Site No. 009, Burial Vault (HISS)	North of B Plant and east of the 218-E-2 Landfill	1953 to 1958	Unknown – believed to be uranium-recovery process operations at tank farms	Equipment. Nothing is known about the waste volume or contaminant inventory. The site contains unsegregated waste only.	130 by 30 m (427 by 100 ft)	The site was used as an above-ground storage site for fission product equipment that became contaminated in the Uranium Recovery Process operations at tank farms. It is not certain that it ever was used as a landfill. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-4, 218-E-5, and 218-E-5A and stabilized in 1980. The site was re-stabilized in 1991 when contaminated vegetation was found.
218-E-10	200-SW-2 TSD	218-E-10, 200 East Industrial Waste No. 10, Equipment Landfill #10	Northwest of B Plant and directly west of the 218-E-5A Landfill	1955 to 2000	100 Area, B Plant (221-B/224-B), Offsite, PUREX (202-A)	26,900 m^3 (35,200 yd^3) of equipment/industrial wastes. The site contains LLW, MLLW, and unsegregated waste. The site contains 4.94 kg Pu, 801 kg U. Contaminants include asbestos, lead, and di-n-octyl phthalate.	Total site is 716 by 617 m (2,350 by 2,025 ft)	The site is located within the LLBG TSD unit. It consists of 13 trenches running north–south and one trench running east-west. Trenches range from 264 to 433 m (865 to 1,420 ft) long by 4.6 to 5 m (15 to 16 ft) wide at the bottom. Wastes disposed to the site include cover blocks, tube bundles, jumper vessels, pumps, columns, and filters. In June 1960, a partially covered burial box of PUREX tube bundles caused an airborne contamination spread (UPR-200-E-23). In 1980, Trenches 1 through 5 were backfilled and stabilized. The section was vegetated with grasses. Surface stabilization also was completed for the eastern 10 ha (25 acres) in 1980.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-E-12A	200-SW-2 Past-Practice	218-E-12A, 200 East Dry Waste No. 12A	Northwest of the C Tank Farm and south of 218-E-12B Landfill	1953 to 1967	200 East Area	15,300 m^3 (20,000 yd^3) of dry waste. The site contains unsegregated waste only. The site contains 8.9 kg Pu, 995 kg U.	Total site is 362 by 12 m (1,188 by 40 ft)	The site contains 28 burial trenches that received cardboard boxes and plastic bags of radioactive waste. Trenches 4 through 11, 15, 16, and 26 through 28 contain acid-soaked material. The specific contents of Trench 28 are not listed. A waste inventory logbook documents burials of tank farm dip tubes, an impact wrench, contaminated cable, jumpers, animal carcasses from 108-F, and an off-site shipment of depleted uranium. The trenches were backfilled, and stabilization occurred in 1979 and 1980. Biobarriers installed at the site included polyethylene liners and ureabor (herbicide) to kill vegetation. The site was stabilized again in 1994 with 46 to 61 cm (19.8 to 24 in.) of clean fill.
218-E-12B	200-SW-2 TSD	218-E-12B, 200 East Dry Waste No. 12B	North of the C Tank Farm and south of 12th St	1967 to present	200 East Area, B Plant, Offsite, PUREX, Tank Farms	65,600 m^3 (85,800 yd^3) industrial wastes. The site contains unsegregated, low-level, and transuranic wastes. In-scope wastes contains 1.39 kg Pu, 7.64 kg U. These inventories do not include Trench 94, containing U.S. Navy reactor compartments, nor post-1970 TRU, which are out of scope of this project.	Total site is 1,259 by 698 m (4,130 by 2,290 ft) All trenches are 4.9 m (16 ft) deep.	The site is located within the LLBG TSD unit. The landfill has the design capacity for 138 trenches running north to south. A total of 38 trenches are filled, 2 were partially filled, and one was excavated and never used. The remaining trenches never were excavated. The southern portion of the site (Trenches 1 through 17) were interim stabilized in 1981 with clean fill. In January 2000, two contaminated tumbleweeds were removed from the site.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-1	200-SW-2 Past-Practice	218-W-1, 200-W Area Dry Waste No. 001, Solid Waste Landfill #1	Northwest of the 234-5Z Building; east of Dayton Ave, between the 218-W-2 and 218-W-11 Landfills	1944 to 1953	200 West Area	7,164 m^3 (9,370 yd^3) dry waste. The site contains unsegregated waste only. The site contains 94 kg Pu, 700 kg U.	Total site is 159 by 140 m (521 by 485 ft) Trenches are 2.4 to 2.7 m (8 to 9 ft) deep	The site contains 15 trenches that run east to west. Twelve trenches are "V" shaped 2.4 m (8 ft) deep and 5 m (16 ft) wide at ground level. The other three trenches are flat-bottomed at 2.7 m (9 ft) deep and 7.3 m (24 ft) wide at the surface. "V" trenches typically were used to dispose of small contaminated articles such as paper, filters, and small pieces of equipment. The flat-bottom trenches contain large pieces of contaminated equipment and wooden, metal, and concrete burial boxes. The trenches have been backfilled, and the site was stabilized in 1983. A surface radiological survey is performed annually.
218-W-1A	200-SW-2 Past-Practice	218-W-1A, 200-W Area Industrial Waste Landfill #1, Equipment Landfill #1	Northwest of 221-T, between two railroad spurs	1944 to 1961	200 West Area	13,700 m^3 (17,900 yd^3) equipment and industrial wastes. The site contains unsegregated waste only. The site contains 2.0 kg Pu, 900 kg U.	Total site is 184 by 139 m (605 by 457 ft)	The site is the first landfill in the 200 West Area to receive large, contaminated equipment. The site contains approximately ten burial areas. The areas include typical trenches and "burial holes." The exact locations of the holes are not known. Most of the equipment was disposed of in wooden boxes that eventually rotted and settled, creating sinkholes. The sinkholes were filled in 1975 with 1.8 m (6-ft) thick concrete cell blocks and clean fill. Radiological surveys are performed annually.
218-W-2	200-SW-2 Past-Practice	218-W-2, 200-W Area Dry Waste No. 002, Dry Waste Landfill No. 2	Northwest of the 234-5Z Building between 218-W-4B and 218-W-1	1953 to 1956	200 West Area	8,240 m^3 (10,778 yd^3) dry waste. The site contains unsegregated waste only. The site contains 126 kg Pu, 1400 kg U.	Total site is 180 by 159 m (589 by 521 ft)	The site is a landfill that contains 20 trenches running east to west. Before backfilling, waste was observed to be within 46 cm (18 in.) of the ground surfaces. Sinkholes were filled in 1974. The site was surface stabilized in 1983 with a minimum of 0.6 m (2 ft) of clean fill and vegetated. A surface radiological survey is performed annually.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-2A	200-SW-2 Past-Practice	218-W-2A, Industrial Waste No. 02A, Equipment Landfill #2	West of the 221-T Building, north of 23rd St, and directly east of the 218-W-3 Landfill	1954 to 1985	200 Area facilities including T Pond soil, REDOX, B Plant, and 234-5Z	25,100 m^3 (32,800 yd^3) equipment and industrial wastes. This site contains unsegregated and low-level wastes. The site contains 6.38 kg Pu, 2,690 kg U	Total site is 536 by 340 m (1,758 by 1,116 ft)	The site is an industrial burial area with 19 trenches; 17 run east to west and 2 run north to south. Solid wastes disposed to the site include tanks, concrete blocks, facility wastes, process equipment, contaminated soil scraped from the 216-T-4-1 Pond (Trench 27), REDOX centrifuges, jumpers, pumps, filters, and miscellaneous cell equipment and wastes. Trench 21 contains a plutonium glovebox. In January 1959, a contamination spread occurred when a burial box containing REDOX jumpers collapsed during backfill operations (UPR-200-W-53). The site was backfilled and surface stabilized in 1980. However, the site remained active until 1985 because of two unused trenches and the cell block burial sites. An undocumented burial box was discovered in June 1983 while extending an active trench. The site was re-stabilized with clean fill and gravel in 2001.
218-W-3	200-SW-2 Past-Practice	218-W-3, Dry Waste No. 003	West of the 221-T Building and directly west of the 218-W-2A Landfill	1957 to 1961	PFP	12,400 m^3 (16,220 yd^3) mostly dry wastes buried with some equipment. This site contains unsegregated wastes only. The site contains 68 kg Pu, 70,000 kg U	Total site is 218 by 155 m (716 by 510 ft)	Although drawings (H-2-32095, Sheet 1, Rev. 11) indicate that the site consists of 20 east-west trenches that range from 122 to 145 m (400 to 475 ft) long with unknown widths, geophysical data collected in 2006 (D&D-30708) and unpublished 1960s logbook evidence show both east-west and north-south trenches that are different in location and differently numbered. The site received miscellaneous unsegregated wastes including drums of depleted uranium, a 1951 pickup truck, and other miscellaneous items, mainly in cardboard boxes. The site is backfilled and was surface stabilized in 1983. A surface radiological survey is performed annually.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-3A	200-SW-2 TSD	218-W-3A, Dry Waste No. 003A	West of the 221-T Building and north of 218-W-3 Landfill	1970 to 1998	100 Area, 200 West Area, 300 Area, PFP, Tank Farms	97,500 m^3 (127,500 yd^3) dry waste and some equipment. The site contains TRU, TRUM, LLW, MLLW, and unsegregated wastes. The site contains 0.55 kg Pu, 634 kg U. Chemicals in wastes disposed to the in-scope trenches or portions of trenches (LLW, MLLW, and unsegregated wastes) include 1,2,4-trimethylbenzene; acetic acid, butyl ester; acetonitrile; aliquat 336; anase; asbestos; barium; batteries; beryllium; cadmium; carbon tetrachloride; carcinogens; caustic; charcoal; chromium; coal tar; copper; cortisporin; cyclohexane; cyclohexanone; dibutyl phosphate; dibutyl-n,n-diethylcarbomyl phosphate; dioxane (1,4-diethylene dioxide); ethanol; ethanolamine; ethylene glycol; glycerin; isopropyl alcohol; kerosene; lead; lithium fluoride; mercury; methanol; naphthalene; napthylamine tritium; n-hexane; n-hexanol; nitric acid; normal paraffins; oil; organic; phosphoric acid; polyurethane; pseudocumene; silver; silver nitrate; slaked lime; sodium; sodium hydroxide; solvents; tetrahydrofuran; toluene; tributyl phosphate; trichloroethylene; trichlorofluoromethane; trioctylphosphine oxide; uranium fluoride; xylene (mixed isomers); zinc; zirconium.	Outside dimensions of the site are 747 by 283 m (2,450 by 930 ft)	The site is located within the LLBG TSD unit. The site was designed to contain 61 trenches running in an east to west direction. Four trenches have not been dug, and the 57 that have been constructed range from 127 to 284 m (417 to 930 ft) in length. In January 1997, beta/gamma contamination caused by pieces of wind-blown tumbleweeds were found at Trench 26. Routine airborne and groundwater monitoring is performed. Perimeter radiological surveys are conducted annually.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-3AE	200-SW-2 TSD	218-W-3AE, Industrial Waste No. 3AE, Dry Waste No. 3AE	East and adjacent to the 218-W-3A Landfill in the 200 West Area	1981 to 2004	100 Area, 1100 Area (1171 Transportation & Maintenance Building), 300 Area, Offsite	34,300 m^3 (44,900 yd^3) of miscellaneous wastes. The site contains TRU, LLW, and MLLW. The TRU at this site will be removed and processed; it is not part of the TPA M-91 scope. The site contains 0.12 kg Pu, 439 kg U. Chemicals in wastes disposed to this site include aluminum nitrate; 2,4-dinotrotoluene; ammonium chloride; asbestos; beryllium; bis (2-ethylhexyl) phthalate; chromium; copper; dibutyl phosphate; ferric nitrate; ferrous ammonium sulfate; hydrobromic acid; lead; mercury; nickel hydroxide; nitrate; oil; polychlorinated biphenyls; potassium nitrate; silver; sodium hydroxide; sodium nitrate; sodium nitrite; sulfuric acid; tetrachloroethylene; trichloroethene; trichlorofluoromethane; zirconium.	Outside dimensions of site are 555 by 445 m (1,820 by 1,460 ft) Trenches are 4.6 to 6.1 m (15 to 20 ft) deep.	The site is located within the LLBG TSD unit. It originally was designed to contain 24 trenches. However, it was re-designed to contain only 12 trenches at deeper depths. Only eight of the trenches were excavated; three of these are only partially filled. The location of this site also included a portion of the 216-T-4B Pond. The site received miscellaneous wastes including rags, paper, rubber gloves, disposable supplies, broken tools, laboratory wastes and industrial waste such as failed equipment, tanks, pumps, ovens, agitators, heaters, hoods, jumpers, decommissioned change trailers, etc. Trenches 5 and 8 contain post-1987 mixed waste.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-4A	200-SW-2 Past-Practice	218-W-4A, Dry Waste No. 04A	Southeast of the intersection of 23rd St and Dayton Ave	1961 to 1968	200 West Area, PFP, REDOX	16,700 m^3 (21,800 yd^3) dry wastes and some equipment. This site contains unsegregated wastes only. The site contains 35.4 kg Pu, 394,000 kg U	Outside dimensions of 320 by 267 m (1,050 by 875 ft)	The site contains 21 trenches oriented east to west and six to eight vertical pipe units or drywells. In addition there is a special burial trench at the east end of Trench 11 containing a REDOX column. All trenches are 9 m (30 ft) wide, with 12.2 m (40 ft) between trench centerlines. They range in length from 153 to 305 m (500 to 1,000 ft). The vertical pipe units were installed near the east end of Trench 16. Each consists of two 55-gal drums welded together with the ends removed except the bottom of the lower drums; they were placed 4.6 m (15 ft) bgs. After each drop containing waste, dirt was shoveled into the well to shield the gamma radiation. Two vertical pipe units as deep as 15 m (48 ft) may be located near the east end of Trench 18. No information has been found on their contents. Drawing H-2-32487 shows details of many individual burials. Unplanned releases to this site (Table B-2) include a fire in the landfill (UPR-200-W-16), spotty contamination release (UPR-200-W-26), a burial box collapse (UPR-200-W-53), and a release of previously buried waste (UPR-200-W-72). The site was stabilized in 1983.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-4B	200-SW-2 TSD	218-W-4B, Dry Waste No. 04B	Northwest of the 234-5Z Building, directly west of 231-Z Building	1968 to 1990	222-S, 300 Area, PFP, and T Plant	10,466 m^3 (13,690 yd^3) of waste as of September 30, 2005. The site contains TRU, LLW, and unsegregated wastes. The site contains 8.98 kg Pu and 21.6 kg U. Chemicals in wastes disposed to the in-scope trenches or portions of trenches (LLW and unsegregated wastes) include beryllium, lead, oil, and zirconium.	189 by 183 m (620 by 600 ft)	The site is located within the LLBG TSD unit and contains miscellaneous debris including rags, paper, cardboard, plastic, and equipment. The site contains 13 trenches and one row of 12 caissons (5 alpha, 6 MFP, and 1 deeper, silo-type that became plugged after receipt of two waste packages). Trenches 7 and 11 and the alpha caissons contain TRU waste planned to be retrieved under M-91. Four of the 5 alpha caissons were used from 1970 to 1979; the fifth is believed to be empty. The alpha and MFP caissons are up to 2.7 m (8.8-ft-) diameter, 3 m (10 ft) high concrete and/or corrugated steel containers with an access chute diameter of approximately 90 cm (36 in.). The silo-type caisson is a 3 m (10-ft-) diameter, 9 m (30-ft-) tall container placed on a concrete foundation with a concrete shielding top slab; it has a 107 cm (42-in.-) diameter access chute. All caissons are equipped with air-filtering systems. Trenches 1 through 6 were surface stabilized and backfilled with clean soil in 1983. Trench 7 is covered with a 1.2 m (4 ft) soil mound. The remaining trenches were backfilled after use and stabilized with clean gravel in 1995.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-4C	200-SW-2 TSD	218-W-4C, Dry Waste No. 004C	Main section located west and southwest of the 234-5Z Building, east of Dayton Ave. Annex is located directly south of the 234-5 Building, north of 16th St	1978 to 2005	100 Area, 300 Area, Offsite, PFP, REDOX	15,200 m^3 (19,900 yd^3) of waste as of September 30, 2005. The site contains TRU, TRUM, LLW, and MLLW. The site contains 0.026 kg Pu, 215 kg U. Chemical in wastes disposed to the in-scope trenches or portions of trenches (LLW/MLLW) include: 1,2-diaminopropane; 1-butene; 2,2,4-trimethylpentane; 3,4(benz-3,6)pyrene; acetic anhydride; acetophenone; acid; chromium; coal tar; copper; cumene hydroperoxide; di-t-butyl-p-cresol; indole picrate; isopropyl iodide; lead; mercury; n,n-disalicylidene; naphthalene; 2-methyl-naphthalene; oil; paint thinner; phenol; silver; slaked lime; sodium; t-butyl hydroperoxide; uranium fluoride; vinyl chloride (chloroethylene); zirconium.	Main portion is 774 by 232 m (2,540 by 760 ft) Unused Annex is 219 by 203 m (719 by 665 ft)	The site is within the LLBG TSD unit. The site is divided into two parts; the section containing burial trenches to the west, and an annex (which never has been used) to the east. The landfill is designed to contain up to 65 trenches. Only 14 trenches have been excavated; 6 of these are only partially filled. The landfill annex area never has been used. The trenches run east to west and range in length from 50 to 232 m (162 to 760 ft). The Z Plant burning pit, which operated during the late 1940s and early 1950s, was reportedly excavated in the 1970s during the construction of Trench 7. Some of the TRU-containing trenches are asphalt lined. Trenches 1, 4, 7, 20, 24, and 29 contain retrievably stored, suspect TRU waste. One drum of suspect TRU was buried in what is otherwise a LLW trench in 1981; records were later examined, and the drum and trench were redefined as containing only LLW. Trenches NC, 14, and 58 contain post-1987 mixed waste.

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description
218-W-5	200-SW-2 TSD	218-W-5, Dry Waste Landfill, Low-Level Radioactive Mixed Waste Landfills	West of Dayton Ave and north of 23rd St	1985 to present	100 Area, 300 Area, Offsite, PFP, Tank Farms	71,000 m^3 (92,900 yd^3) of total wastes as of September 30, 2005. This site contains LLW and MLLW. The site contains 0.17 kg Pu, 6,915 kg U. Chemicals in wastes disposed to the in-scope trenches (i.e., all trenches except 31 and 34) include lead, oil, and slaked lime.	Outside dimensions of 1,013 m by 366 m (3,320 by 1,200 ft)	The site is an active TSD unit. The landfill is designed to contain 18 low-level and four mixed waste trenches. Currently there are 11 inactive low-level trenches; two of these (Trenches 22 and 24) contain post-August 19, 1987, mixed waste. In addition, the only two currently active RCRA-compliant lined mixed waste trenches within the LLBG TSD are located at this landfill (Trenches 31 and 34). The RCRA-compliant trenches are out of scope of this project.
218-W-11	200-SW-2 Past-Practice	218-W-11, Regulated Storage Site	Northwest of the 234-5Z Building and north of 218-W-1	1960 - 1960	Tank Farms - Uranium Recovery Process and Sr/Cs Recovery Operations	1,160 m^3 (1,520 yd^3) miscellaneous solid debris. The site contains unsegregated wastes only. No plutonium or uranium inventories are reported for this site.	Total area is 159 by 55 m (520 by 180 ft) Trenches are 4.6 m (15 ft) deep.	The unit consists of two burial trenches 77 m (258 ft) and 46 m (150 ft) long, respectively. Sources conflict as to whether the southernmost of the two trenches ever was excavated and filled. Geophysics data collected in 2006 (D&D-30708) suggest that the trench does not exist. Before stabilization in 1983, a portion of the landfill was used for above-ground storage of contaminated equipment. The waste is low-level contaminated equipment. A surface radiological survey is performed annually.

CCN 089215, "Notification of Exceedance of Critical Mean Value for Specific Conductance at the Non-Radioactive Dangerous Waste Landfill."
D&D-30708, *Geophysical Investigations Summary Report; 200 Areas Burial Grounds: 218-E-1, 218-E-2A, 218-E-8, 218-E-12A, 218-W-1, 218-W-2, 218-W-3, and 218-W-11.*
Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order.*
H-2-32487, *218-W-4A Dry Waste Burial Site.*
H-2-32095, *218-W-2A Industrial Burial Ground & 218-W-3 Dry Waste Burial Ground.*
Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.
Waste Information Data System Report, Hanford Site database.
WHC-SD-EN-TI-199, *NRDWL Soil Gas Survey Final Data Report.*

Table B-1. Summary of Information for 200-SW-1 and 200-SW-2 Operable Unit Landfills. (15 Pages)

Site Code	OU and Category	Site Name	Location	Dates of Waste Receipt	Source Facilities Contributing More than 5% of Waste by Volume	Contaminant Inventory Volume (In-Scope Low-Level and Unsegregated Wastes only)	Waste Site Dimensions	General Description

bgs = below ground surface.
LLBG = low-level landfill.
LLW = low-level waste.
MFP = mixed fission product.
MLLW = mixed low-level waste.
N/A = not available or not known.
OU = operable unit.
PFP = Plutonium Finishing Plant.
PUREX = Plutonium-Uranium Extraction (Plant).
RCRA = *Resource Conservation and Recovery Act of 1976.*
REDOX = Reduction oxidation (S Plant).
RR = railroad.
SWITS = *Solid Waste Information and Tracking System.*
TPA = Tri-Party Agreement (*Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989).
TRU = Radioactive waste as defined in DOE G 435.1 1, *Implementation Guide for Use with DOE M 435.1-1.*
TRUM = transuranic waste mixed with dangerous waste components.
TSD = treatment, storage, and/or disposal (unit).
UPR = unplanned release.
WIDS = *Waste Information Data System* database.

Table B-2. Summary of Information for Waste Sites Co-Located with 200-SW-2 Operable Unit Landfills. (6 Pages)

Site Code	OU	Site Name	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
UPR-200-E-23	SW-2	UPR-200-E-23, Burial Box Collapse at 218-E-10, UPR-200-W-158	Release occurred at 218-E-10 Landfill; the contamination spread east and southeast up to 3 miles (4.8 km) beyond the 200 East Area perimeter fence.	June 10, 1960	PUREX F-11 and H-4 tube bundles	Particles and contaminated soil	N/A	N/A	The unplanned release (UPR-200-E-23) occurred at the 218-E-10 Landfill when large boxes of contaminated PUREX equipment collapsed and spread contamination. The maximum dose rate at the box was 5 rad per hour (100 ft) from the box. The box was covered partially with soil. ("Consolidated").
UPR-200-E-24	SW-2	UPR-200-E-24, Contamination Plume from the 218-E-10 Landfill, UN-200-E-24	Contamination spread from 218-E-10 Landfill to 3 miles (4.83 km) beyond the 200 East Area perimeter fence.	June 10, 1960	PUREX F-11 and H-4 Tube bundles	Particles and contaminated soil	N/A	N/A	An unplanned release (UPR-200-E23) occurred at the 218-E-10 Landfill when large boxes of PUREX equipment collapsed and spread contamination. This related unplanned release (UPR-200-E-24) is also reported to account for the airborne contamination plume from the broken box. ("Consolidated").
UPR-200-E-30	SW-2	UPR-200-E-30, UN-200-E-30	Within the 218-E-10 Landfill.	April 20, 1961	N/A	Process jumpers and contaminated soil	N/A	Area of 37,161 m^2 (400,000 ft^2)	A wooden burial box containing 82 highly contaminated process jumpers collapsed as it was covered with soil. This has been assigned to the 218-E-10 Landfill. Maximum contamination of 500 mr/h was spread over a 400,000 ft^2 area. The landfill has been surface stabilized. ("Consolidated").

Table B-2. Summary of Information for Waste Sites Co-Located with 200-SW-2 Operable Unit Landfills. (6 Pages)

Site Code	OU	Site Name	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
UPR-200-E-53	SW-2	UPR-200-E-53, UN-200-E-53, Contamination at 218-E-1	The release occurred at 218-E-1 Landfill.	October 17, 1978	N/A	Contaminated soil	N/A	46 by 15 m (150 by 50 ft)	In October 1978, a contamination spread occurred during backfilling operations when shallow buried contaminated waste in an adjacent trench was uncovered by a bulldozer. Numerous spots of radioactive contamination were detected within the south end of the 218-E-1 Trench. The contaminated soil was reburied, and clean fill was spread over the area. The surface of the landfill was stabilized in 1981. The release is not marked or posted, but the 218-E-1 Landfill is marked and posted. ("Consolidated").
UPR-200-E-61	SW-2	UPR-200-E-61, Radioactive Contamination from Railroad Burial Cars, UN-216-E-61, UN-200-E-61	The release occurred in the railroad right- of-way at the landfill unloading ramp in the 218-E-10 Landfill area.	1981	B Plant	N/A	N/A	N/A	This contamination already has been cleaned up. The site is located at the railroad right-of-way within the area mapped as the Industrial Landfills (218-E-10). It is contamination found after a concrete burial box was off -loaded from railroad cars to landfills. The box left B Plant with unacceptable levels of contamination that were not found until after the box had been off-loaded. Both the railroad car and the offloading ramp showed smearable contamination. They were decontaminated within a few days after discovery. ("Rejected").

Table B-2. Summary of Information for Waste Sites Co-Located with 200-SW-2 Operable Unit Landfills. (6 Pages)

Site Code	OU	Site Name	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
UPR-200-W-11	SW-2	UPR-200-W-11, Landfill Fire, UN-200-W-11, UPR-200-W-16	Within the 218-W-1 Landfill.	July 9, 1952	N/A	Airborne radioactive contamination including alpha particles.	N/A	N/A	This site was a result of a spontaneous fire in the 218-W-1 Landfill. It is a duplicate of UPR-200-W-16. ("Consolidated").
UPR-200-W-134	SW-2	UPR-200-W-134, Improper Drum Burial	218-W-3A Landfill, Trench 30, WSP coordinates 137358N, 566159 to 566166 E.	Oct. 28, 1975	325 Building, 300 Area.	None.	N/A	N/A	UPR-200-W-134 involved the improper burial of a TRU-labeled drum (container ID 325-75-0473S) in 1975 at the 218-W-3A Landfill. Although the drum did not fail nor release contamination, it was not buried as retrievably stored waste per requirements. The trench section where it was buried was re-designated as transuranic (ARH-CD-594). ("Consolidated").
UPR-200-W-16	SW-2	UPR-200-W-11, Landfill Fire, UN-200-W-11, Fire at 218-W-1 Landfill	Within 218-W-1 Landfill.	July 9, 1952	N/A	Airborne radioactive contamination including alpha particles.	N/A	N/A	The release was a result of a spontaneous fire in the 218-W-1 Landfill. The trench where the fire occurred runs east and west and was roughly in the center of the landfill. A fire in the dry waste spread plutonium contamination in the vicinity of 231-Z Building. The contaminated soil was bulldozed into the trench. The ground on the north side was stabilized with oil, and roads near Z Plant were washed down with water. ("Consolidated").

Table B-2. Summary of Information for Waste Sites Co-Located with 200-SW-2 Operable Unit Landfills. (6 Pages)

Site Code	OU	Site Name	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
UPR-200-W-26	SW-2	UPR-200-W-26, Contamination Spread During Burial Operation	Assumed to be 218-W-1A Landfill and along the railroad tracks.	November 27, 1953	221-T	Soil contamination from 221-T spent equipment	N/A	N/A	A box of used connectors was removed from the 221-T Building and buried in the 218-W-1A (alias Railroad) Landfill. During unloading, the lid was dislodged and contamination was spread to the flatcar and surrounding ground. ("Consolidated").
UPR-200-W-37	SW-1	UPR-200-W-37, Contaminated Boxes Found in a Burn Pit	East of Dayton Avenue Ave, southwest of Z Plant within the 218-W-4C Landfill.	June 10, 1955	N/A	High-level dry waste	N/A	N/A	Three boxes mistakenly containing dry, high-activity waste were sent to the Z Plant burn pit, which was located within what is now 218-W-4C. The boxes were noticed before being burned, but during removal, it was noted that one box had opened in the pit causing radiological contamination. The boxes were removed and sent to the proper burial trench. ("Consolidated").
UPR-200-W-45	SW-2	UPR-200-W-45, Burial Box Collapse	Believed to have occurred in 218-W-2A	November 6, 1957	REDOX	Ruthenium-contaminated soil and airborne particles	N/A	10 km^2 (4 $miles^2$)	A burial box containing ruthenium-contaminated process equipment from REDOX collapsed and released contamination throughout the 200 West Area in November 1957. Skin and/or personal clothing contamination occurred to 12 employees and 15 vehicles. Personnel and property were decontaminated, and measures to prevent the spread of contamination were implemented. ("No Action").

Table B-2. Summary of Information for Waste Sites Co-Located with 200-SW-2 Operable Unit Landfills. (6 Pages)

Site Code	OU	Site Name	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
UPR-200-W-53	SW-2	UPR-200-W-53, Burial Box Collapse	East from the 218-W-2A Landfill to within 275 m (902 ft) of the east perimeter fence of the 200 West Area	January 8, 1959	REDOX	Spent equipment caused contaminated soil and airborne particles	N/A	101 ha hectares (250 acres)	A burial box containing process equipment from REDOX collapsed and released fission product contamination into the 200 West Area in January 1959. Skin and/or personal clothing contamination occurred to 12 employees and 15 vehicles. Personnel and property were decontaminated, and measures to prevent the spread of contamination were implemented. ("Consolidated").
UPR-200-W-72	SW-2	UPR-200-W-72, Contamination at 218-W-4A	Within the 218-W-4A Landfill.	1975	N/A	Laboratory waste and contaminated soil	N/A	15 by 15 m (50 by 50 ft)	Contaminated laboratory waste was found with gross alpha and mixed fission product contamination in October 1975. The waste had been buried years before at the previously required 1.2 m (4 ft) depth. Soil erosion caused the waste to become exposed. The waste was removed, and the area was covered with 15 cm (6 in.) of sand, a layer of urea bore, a layer of 10-mil plastic, 31 to 36 cm (12 to 14 in.) of soil, and 8 to 10 cm (3 to 4 in.) of rock. ("Consolidated").
UPR-200-W-84	SW-2	UPR-200-W-84, Ground Contamination During Burial Operation at 218-W-3A	Within the 218-W-3A landfill, most likely Trench TS9	July 23, 1980	N/A	Liquid waste	N/A	N/A	In July 1980, a liquid spill occurred in the 218-W-3A Landfill when chemical waste (beta/gamma) was being pumped from a truck to the landfill. The pump and contaminated soil were placed in a burial trench. The truck was cleaned and thoroughly decontaminated at a separate site. ("Consolidated").

Table B-2. Summary of Information for Waste Sites Co-Located with 200-SW-2 Operable Unit Landfills. (6 Pages)

Site Code	OU	Site Name	Location	Dates of Operation	Source Facility	Contaminant Inventory/ Volume Released	Depth	Waste Site Dimensions	General Description
Z Plant BP	SW-1	Z PLANT BP, Z Plant Burning Pit	It is located east of Dayton Ave, within the boundaries of the current 218-W-4C Landfill.	1948 to 1960	N/A	The burn pit received 2,000 m^3 of wastes for burning, including less than 1,000 m^3 of laboratory chemicals.	3.0 m	12.2 by 15.2 m	Consolidated with 218-W-4C. This unit is a rectangular burning pit located within (under) Landfill 218-W-4C. The site was exhumed during the excavation of Trench 7 in the 218-W-4C Landfill. ("Consolidated").

ARH-CD-594, *Specifications for the Transuranic Drum buried on October 28, 1975.*
Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

BP = burning pit.
N/A = not applicable.
OU = operable unit.
PUREX = Plutonium-Uranium Extraction (Plant).
RCRA = *Resource Conservation and Recovery Act of 1976.*
REDOX = Reduction Oxidation (S Plant).
SW-1 = 200-SW-1 Nonradioactive Landfills and Dumps Operable Unit.
SW-2 = 200-SW-2 Radioactive Landfills and Dumps Operable Unit.
TRU = Radioactive waste as defined in DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1.*
TSD = treatment, storage, and/or disposal (unit).
UPR = unplanned release.
WIDS = *Waste Information Data System* database.

REFERENCES

ARH-CD-594, 1975, *Specifications for the Transuranic Drum buried on October 28, 1975*, Atlantic Richfield Hanford Company, Richland, Washington.

CCN 089215, 2001, "Notification of Exceedance of Critical Mean Value for Specific Conductance at the Non-Radioactive Dangerous Waste Landfill," (letter to M. J. Furman, U.S. Department of Energy, Richland Operations Office, from S. P. Luttrell), Pacific Northwest National Laboratory, Richland, Washington, May 11.

D&D-30708, 2006, *Geophysical Investigations Summary Report; 200 Areas Burial Grounds: 218-E-1, 218-E-2A, 218-E-8, 218-E-12A, 218-W-1, 218-W-2, 218-W-3, and 218-W-11*, Fluor Hanford, Richland, Washington.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

H-2-32095, *218-W-2A Industrial Burial Ground & 218-W-3 Dry Waste Burial Ground*, Hanford Site Drawing.

H-2-32487, *218-W-4A Dry Waste Burial Site*, Hanford Site Drawing.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

Waste Information Data System Report, Hanford Site database.

WHC-SD-EN-TI-199, 1993, *NRDWL Soil Gas Survey Final Data Report*, Westinghouse Hanford Company, Richland, Washington.

APPENDIX C

COLLABORATIVE-NEGOTIATIONS COMPLETION MATRIX STATUS

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TABLE

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TERMS

CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE	U.S. Department of Energy
DQO	data quality objective
Ecology	Washington State Department of Ecology
FS	feasibility study
OU	operable unit
RCRA	*Resource Conservation and Recovery Act of 1976*
RI/FS	remedial investigation/feasibility study
RL	U.S. Department of Energy, Richland Operations Office
ROD	record of decision
Tri-Parties	U.S. Environmental Protection Agency, Washington State Department of Ecology, U.S. Department of Energy
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989)
TRU	Radioactive waste as defined in DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1*
TSD	treatment, storage, and/or disposal (unit)

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APPENDIX C
COLLABORATIVE-NEGOTIATIONS COMPLETION MATRIX STATUS

C1.0 INTRODUCTION

During collaborative discussion meetings that were held in January and February 2005 regarding DOE/RL-2004-60, *200-SW-1 Nonradioactive Landfills and Dumps Group Operable Unit and 200-SW-2 Radioactive Landfills and Dumps Group Operable Unit Remedial Investigation/Feasibility Study Work Plan*, Draft A (RI/FS work plan), the Washington State Department of Ecology (Ecology) and the U.S. Department of Energy (DOE), Richland Operations Office created a completion matrix to capture changes that Ecology requested, and DOE's responses in support of Ecology's requests. Table C-1 was recreated and modified for inclusion in this appendix, as described below.

Table C-1 was extracted from Ecology and DOE, 2005, *200-SW-1 and 200-SW-2 Collaborative Workshops, Agreement, Completion Matrix, and Supporting Documentation, Final Product*, dated April 18, 2005 (available via the Tri-Party Agreement Administrative Record at: http://www2.hanford.gov/arpir/common/findpage.cfm?AKey=D7803318). This table has been modified for purposes of addressing each of the comments/commitments that were captured on the original Completion Matrix. The original Completion Matrix was modified by adding the right-most column to note how each comment is being been addressed in this work plan or a future revision to this document. Given the phased approach for this RI/FS process, future revisions to this document are planned.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
1.2 Scope and Objectives, or in 2.0 Background and Setting	Add a table of "Key Assumptions" that drive your scope/cost/schedule. See Idaho OU7-13-14 for example of key assumptions. Note that the U.S. Environmental Protection Agency's guidance on RI/FSs (EPA/540/G-89/004) suggests a work plan section titled "Costs and Key Assumptions." It may be appropriate to add such a section to this work plan, to the extent that certain cost information would helpful. For example, if treatability investigations are anticipated, and the cost would be in the range of $20 million per year (the Idaho National Laboratory figure), that would be information that would be critical for scheduling the RI/FS.	DOE will develop a table of key assumptions that drive scope, schedule, and cost. During the DQO process, these key assumptions will be developed jointly by Ecology and DOE. Costs: DOE will provide summary level cost estimates to support funding requests to complete the RI/FS, and for managing the project.	Key assumptions developed during the collaborative DQO processes have been added to Section 1.4 of the Draft B RI/FS work plan. A description of the detailed cost analysis that will be evaluated in the FS is presented in Section 5.7.4 of the Draft B RI/FS work plan.
2.2 Waste Site Descriptions and History	Update this section using the results of geophysical surveys, soil gas surveys, and surface radiation surveys. The scope of the nonintrusive sampling will include the entire surface area of the Bin 3B sites (15) and the used portions of the radioactive Bin 3A sites (7).	DOE agrees to update Section 2.2 or 3.0 of the work plan using mutually agreed upon, nonintrusive sampling information.	Section 3.4.2 of the Draft B RI/FS work plan includes the results of the nonintrusive field work performed as part of the Phase-IA DQO process. This also includes a discussion of the additional geophysics performed before completion of the Phase-IB DQO and sampling and analysis instruction. Phase-IA survey results are presented in Appendix D of the Draft B RI/FS work plan.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
2.2 Waste Site Descriptions and History	Update this section using the results of the records review. The scope of the records review should focus on waste streams, waste form, dates of operation, waste descriptions, and anomalous conditions.	DOE agrees to update Section 2.2 or Section 3.0 of the work plan using the historical records approach consistent with the Draft A work plan.	Section 2.2 of the Draft B RI/FS work plan has been revised to include information gathered during the historical records review performed as part of the Phase I-A DQO process. Additionally, Section 5.4.1.1 details the historical information review process. The initial conceptual site models presented in Appendix E also resulted from the extensive records review.
3.0 Initial Evaluation of Waste Sites	Expand description of why contamination is not expected to be a threat to groundwater. NOTE: Simple graphics and associated statements in existing work plan are an adequate and acceptable format and content for the conceptual site model.	DOE will add to the existing conceptual site model in Draft B of the work plan discussions concerning mobility of contaminants and those areas where there has been flooding or other sources of water.	Section 3.9 of the Draft B RI/FS work plan discusses the initial conceptual site model development process, including the results of the Hanford Features, Events, and Processes analysis performed by Fluor Hanford and Pacific Northwest National Laboratory personnel. Initial conceptual site model graphics for the six bins, as well as the 24 landfills in the 200-SW-2 OU, are presented in Appendix E of the Draft B RI/FS work plan.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
3.1 Known and Suspected Contamination, and 3.2 Conceptual Contaminant Distribution Models	Summarize the "items of interest" (i.e., distributed in Session 3) and identify which ones are more likely to pose a threat of release.	DOE agrees to summarize items of interest based on waste form; waste stream with focus on logic to support decisions. The DQO Data Gap Analysis Table will provide the format for the summary.	The Ecology "Items of Interest" were evaluated in the Phase I-A and I-B DQOs. Both DQOs included a detailed data gap analysis to identify those items that are most likely to pose a threat of release. The results of the data gap analysis from the DQOs have been carried forward into the Draft B RI/FS work plan, Section 4.4.
3.5.2 Potential Human and Ecological Receptors	Discuss potential exposure pathways especially for industrial items. Cross-reference to: Section 5.0 RI/FS Study Process: discuss assumptions about release mechanisms for contamination in industrial items. For example, less sampling could be required because of the waste form and/or release mechanism (e.g., contaminated rail cars). Use this section discussion to drive 4.1.2 Data Needs.	DOE agrees to add discussion on exposure pathways and the release mechanisms for different waste forms.	Section 3.8.1 discusses potential human health and ecological receptors. Additionally, the conceptual exposure pathway model is presented graphically in Appendix E of the Draft B RI/FS work plan.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
4.0 Work Plan Approach and Rationale	Develop logic for vadose-zone sampling to confirm conceptual site model for potential threat to groundwater. Propose some deeper (beyond the bottom elevation of trenches) data collection to characterize the depth of contamination, tying the sampling locations to those locations where infiltration is more of a concern (e.g., where there is a record of flooding).	DOE agrees to provide a more developed data collection logic to characterize depth of contamination below trenches in the waste sites. Specific sampling location/ methodologies will be developed through the DQO process.	Section 4.2 discusses the proposed use of direct pushes into the vadose zone as part of Phase I-B characterization activities. Additional details regarding the Phase I-B sampling design are presented in Appendix A (sampling and analysis plan) of the Draft B RI/FS work plan. Following the completion of Phase I-B, another DQO process will be held to specify additional intrusive sampling for Phase II.
4.0 Work Plan Approach and Rationale	Update the rationale to tie sampling locations to results of geophysical surveys, soil gas surveys, and surface radiation surveys (when available).	DOE agrees to update the rationale for sample design to include knowledge gained through geophysical surveys, soil gas surveys, and surface radiation surveys as defined in Section 2.2.	Section 4.2 of the Draft B RI/FS work plan presents the rationale for using historical information reviews and the results of the Phase I-A field surveys to focus the Phase I-A field surveys. This section also states that future phase characterization activities will be focused by past-phase sampling activities.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
4.1.1A. Data Uses	Identify data uses for treatability investigations. Cross-reference to: Section 5.0 RI/FS Study Process: where there should be a separate section on treatability investigations. Cross-reference to: Section 5.5 Post-Record of Decision (ROD) Activities: where there should be a discussion of post-ROD treatability investigations for design. Ecology commented that pilot tests may be needed because of the limited usefulness of Idaho National Laboratory and M-091 cost data.	DOE will update the work plan to include the process that will be used to evaluate the need for treatability studies (see discussion under Section 5.0.A). DOE will evaluate the value of pilot test data versus the relatively (compared to bench scale tests) large cost of these types of tests. This will be done through a qualitative evaluation – based on what we know, data available that are applicable, no data available but can make assumptions. Currently envision that these data will be captured in the treatability table and treatability subsection.	Treatability investigations proposed for the 200-SW-2 OU landfills are discussed in Section 5.7.3 of the Draft B RI/FS work plan. Other focused investigations are discussed in Section 5.7.4.2.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
4.1.1B Data Uses	Explain how the data will allow an evaluation of each likely response scenario, including problems with potential for worker exposure.	DOE will explain how proposed data collection will allow balancing between short-term effectiveness, long-term effectiveness, cost, and implementability.	This comment will be addressed in the next revision of the RI/FS work plan, to be published after the completion of the Phase II DQO process. Data to be collected during Phase I-B characterization activities mainly include investigative nonintrusive surveys. These data will help focus future-phase characterization efforts that will be more specifically tied to evaluation of each likely-response scenario. Phase 1-B generally supports all scenarios. The nine CERCLA criteria are discussed in Section 5.8.2 of the RI/FS work plan and will be carried forward into future revisions of the document.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
4.1.1C Data Uses	Ecology believes that some of the data from M-091 retrievals might satisfy the data needs that will be identified in the DQO for this work plan. If so, describe what data will come out of M-091 retrievals, and how the data will be used in this RI/FS.	DOE anticipates including unit cost data and worker exposure data from appropriate M-091 activities. Implementability data may be available as well. DOE will report how M-091 retrievals validated or changed conceptual site models derived from process knowledge (i.e., generate confidence in process knowledge for those waste streams for those years).	Data collected as part of the M-091 Program activities, as well as data from the 200-PW-1 OU remedial investigation are discussed in Section 3.3.2.1. In addition, analytical data are presented in Appendix D of this RI/FS work plan. These data will be included in the RI report and carried forward into the FS for evaluation.
4.1.2A Data Uses	Ecology believes that some of the data from potential 618-10/11 technology deployment might satisfy the data needs that will be identified in the DQO for this work plan. If so, describe what data will come out of 618-10/11 technology deployment and how the data will be used in this RI/FS.	DOE will identify data needs and determine if other projects such as 618-10 and 618-11 can provide that information.	Relevant information from the 618-10/11 project is discussed in Section 5.7.3 of the Draft B RI/FS work plan. The RI/FS work plan also discusses the importance of coordination with TRU waste retrieval (M-091 Program) and post-retrieval characterization activities.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
4.1.2B Data Needs	Identify what cost data are needed, especially: • Where would data come from for removal, treatment, and disposal estimates (noting that this is not a routine estimate)? • The Implementation Plan (DOE/RL-98-28) identified need for site-specific information for in situ vitrification. Where will cost data come from for in situ vitrification? • Where will cost data come from for removal, treatment, and disposal or in situ treatment of various items of interest?	• See 4.1.1A • See 4.1.1A • DOE will use the DQO to evaluate the need for cost data for items of interest. If needed, DOE will evaluate if these data already exist in the Treatability Table described above. If not available, then DOE will evaluate how to get the data.	Information on cost estimating is presented in Section 5.7.4 of the Draft B RI/FS work plan.
4.1.2C Data Needs	Discuss whether data are needed to refine estimates of transuranics. Is the likely percentage of removal, treatment, and disposal waste that would designate as TRU a key parameter in cost estimates? If so, what additional data are needed to develop more accurate estimates?	DOE will evaluate in situ technologies for assaying transuranics.	Treatability investigations regarding evaluation of in situ technologies for assaying transuranics are discussed in Section 5.7.3 of the Draft B RI/FS work plan.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
4.1.4 Data Quantity	Burial grounds are difficult to characterize. Ecology expects that the heterogeneity of the waste may result in small data sets. Describe what statistical evaluation of data will be used in the risk assessment for small data sets. Ecology will participate and concur in the DQO.	DOE will specify data evaluation for small data sets. DOE and Ecology will have risk assessors participate/discuss the issue of small data sets as part of the DQO process.	This comment will be addressed in the next revision of the RI/FS work plan, to be published after the completion of the Phase II DQO process. Data to be collected during Phase I-B characterization activities include mainly investigative nonintrusive surveys to help focus future-phase characterization efforts. A baseline risk assessment is proposed for development in fiscal year 2008, as noted in Figure 5-2.
4.2 Characterization Approach or 4.1	Discuss available characterization approaches, and justify why some approaches were discarded and why the selected approach was chosen.	DOE agrees to provide characterization approaches rationale in a format similar to Chapter 7.0 (add a column that describes why technique was not selected) of the DQO.	This comment is addressed in Section 5.7.31, and within the referenced document (PNNL-16105).
5.0A RI/FS Study Process	Include a separate section on treatability study investigations.	DOE will add this as a separate section and treatability needs will be discussed as well.	Treatability investigations proposed for the 200-SW-2 OU landfills are discussed in Section 5.7.3 of the Draft B RI/FS work plan.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
5.0B RI/FS Study Process	Add a subsection for "Cost Estimating." Describe the potential cost estimating alternatives; e.g., computer package, parametric approach, specialty cost for estimating nonstandard, unusual costs that typically are not estimated. Identify the key cost parameters; e.g., waste volume, waste treatment costs, disposal costs. Identify the data needed or already available to supply these parameters.	DOE will list the possible estimating approaches (re: DOE guidance) to identify the different data needs that might be used to feed each. The data needs will be addressed in Chapter 4.0 of the work plan.	Information on cost estimating is presented in Section 5.7.4 of the Draft B RI/FS work plan.
5.0C RI/FS Study Process	Ecology will supply an expanded description of RCRA-CERCLA integration, specifically identifying how to avoid "pre-decisional" actions.	DOE will review and comment on the draft and both parties will resolve comments. Anticipate within the next 2 to 4 weeks.	Section 5.1 provides an expanded description of RCRA-CERCLA coordination.
5.3 FS/RCRA TSD Unit Closure Plan	Describe approach to close unused portions of TSDs. *(Ecology will provide the manner in which RCRA TSD closure/post closure plan requirements will be met in the Work Plan and subsequent documents [Section 5.5 of the TPA])*	DOE will prepare reclassification forms before the work plan revision for the unused portions. For sites that are not reclassified as rejected, DOE will place those sites in Bin 1.	Closure of the unused portions of the TSDs are addressed in Section 5.8.4.1 of the Draft B RI/FS work plan.
5.4 Proposed Plan and Proposed RCRA Permit Modification	Add a closure plan crosswalk (e.g., as done in the 200-UW-1 FS [DOE/RL-2003-23]). The crosswalk can be used to do a completeness review for those components of the Closure Plan that will come from the RI/FS work plan or other existing documents. Ecology also can use it to evaluate the adequacy of the planned investigations to satisfy TSD unit sampling requirements.	DOE will provide the crosswalk in the revised work plan (Table 11, page 33 of the 200-UW-1 Proposed Plan [DOE/RL-2003-24] [Ecology's generic crosswalk format]).	A closure plan crosswalk is presented in Table 5-6 of the Draft B RI/FS work plan.
5.4.2 Regional Site Closure	Revise the text to address DOE's interest in "Integration/alignment of 'decisions' and activities in the Core Zone. Cross-reference this to Sections 4.1 and 4.2 and summarize how this affected the DQOs or characterization approach.	DOE will incorporate additional detail when the work plan is updated and submitted.	The regional closure strategy was prepared by Fluor Hanford and is documented in CP-22319-DEL, *Plan for Central Plateau Closure*. This plan is cited in Section 5.8.2 of the Draft B RI/FS work plan.

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
5.5 Post-ROD Activities	Discuss long lead time activities including potential treatability investigations for design.	DOE will describe the concept of phasing a response for different areas and how the lead time on treatability investigations for design could make some burial grounds come later in the overall response. DOE will explain how the need for post-ROD treatability investigations will not prevent them from meeting the requirement for substantive and continuous remediation 15 months post-ROD.	Treatability investigations proposed for the 200-SW-2 OU landfills are discussed in Section 5.7.3 of the Draft B RI/FS work plan.
6.0A Schedule	• Add optional "treatability investigations" with a typical duration, showing the critical path relationship. • It's okay to distinguish between treatability investigations required for the FS, and those required for remedial design. • Show activities to two work breakdown structure levels below treatability investigation, to allow evaluation of the "typical" duration. Two levels below might include: – Draft test plan – Regulatory review/approval cycle for test plan – Procurement – Testing – Draft test report – Regulatory review/approval cycle for report – The predecessor-successor relationship to the FS.	• If DOE can establish in the DQO that a treatability investigation is not needed, then this level of detail is not required. • If needed, DOE will provide the treatability test plan schedule consistent with the level of detail currently in the work plan.	Treatability investigations proposed for the 200-SW-2 OU landfills are discussed in Section 5.7.3 of the Draft B RI/FS work plan. As the need for treatability investigations is determined, a more detailed schedule will be included in Chapter 6.0. This likely will be included after the Phase II DQO process and revision to the RI/FS work plan has occurred. Under the phased approach, future/ additional sampling and analysis plan and revisions to this work plan are planned (as noted in the schedule).

Table C-1. Collaborative-Negotiations Completion Matrix. (11 Pages)

Section	Description (Ecology)	Details (RL)	Resolution
6.0B Schedule	• Discuss critical assumptions for schedule, unless discussed in earlier (added) section on key assumptions. • Discuss long lead time activities including nuclear safety authorization.	DOE will discuss critical assumptions, and long lead activities unless discussed in earlier section on "Key Assumptions" (Section 1.1.2).	Chapter 6.0 of the Draft B RI/FS work plan includes a high-level schedule of activities based on the Fluor Hanford baseline working schedule. Project assumptions also are noted in Section 1.4 of the Draft B RI/FS work plan.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.
DOE/RL-98-28, *200 Areas Remedial Investigation/Feasibility Study Implementation Plan – Environmental Restoration Program.*
DOE/RL-2003-23, *Focused Feasibility Study for the 200-UW-1 Operable Unit.*
DOE/RL-2003-24, *Proposed Plan for the 200-UW-1 Operable Unit.*.
Ecology et al., 1989, *Hanford Federal Facility Agreement and Consent Order.*
EPA/540/G-89/004, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, (Interim Final)*, OSWER 9355.3-01.
Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

CERCLA = *Comprehensive Environmental Response, Compensation, and Liability Act of 1980.*
DOE = U.S. Department of Energy.
DQO = data quality objective.
Ecology = Washington State Department of Ecology.
FS = feasibility study.
OU = operable unit.
RCRA = *Resource Conservation and Recovery Act of 1976.*
RI/FS = remedial investigation/feasibility study.
RL = U.S. Department of Energy, Richland Operations Office.
ROD = record of decision.
TPA = Tri-Party Agreement (*Hanford Federal Facility Agreement and Consent Order* (Ecology et al., 1989).
TRU = Radioactive waste as defined in DOE G 435.1-1, *Implementation Guide for Use with DOE M 435.1-1.*
TSD = treatment, storage, and/or disposal (unit).

C2.0 REFERENCES

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 USC 9601, et seq.

CP-22319-DEL, 2004, *Plan for Central Plateau Closure*, Rev. 0, Fluor Hanford, Richland, Washington.

DOE/RL-98-28, 1999, *200 Areas Remedial Investigation/Feasibility Study Implementation Plan – Environmental Restoration Program*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2003-23, 2005, *Focused Feasibility Study for the 200-UW-1 Operable Unit*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2003-24 Reissued, 2005, *Proposed Plan for the 200-UW-1 Operable Unit*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOE/RL-2004-60, 2004, *200-SW-1 Nonradioactive Landfills and Dumps Group Operable Unit and 200-SW-2 Radioactive Landfills and Dumps Group Operable Unit Remedial Investigation/Feasibility Study Work Plan*, Draft A, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

Ecology and DOE, 2005, *200-SW-1 and 200-SW-2 Collaborative Workshops, Agreement, Completion Matrix, and Supporting Documentation, Final Product*, (Correspondence Control No. 0064527), Washington State Department of Ecology and U.S. Department of Energy, Richland Operations Office, Richland, Washington, April 18.

Ecology, EPA, and DOE, 1989, *Hanford Federal Facility Agreement and Consent Order*, 2 vols., Washington State Department of Ecology, U.S. Environmental Protection Agency, and U.S. Department of Energy, Olympia, Washington, as amended.

EPA/540/G-89/004, 1988, *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, (Interim Final)*, OSWER 9355.3-01, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C.

PNNL-16105, 2007, *Technology Survey to Support Revision to the Remedial Investigation/Feasibility Study Work Plan for the 200-SW-2 Operable Unit at the U.S. Department of Energy's Hanford Site,* Pacific Northwest National Laboratory, Richland, Washington.

Resource Conservation and Recovery Act of 1976, 42 USC 6901, et seq.

APPENDIX D

DATA COLLECTED TO SUPPORT CHARACTERIZATION OF LANDFILLS IN THE 200-SW-2 OPERABLE UNIT

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TABLES

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APPENDIX D

DATA COLLECTED TO SUPPORT CHARACTERIZATION OF LANDFILLS IN THE 200-SW-2 OPERABLE UNIT

This appendix includes a collection of results of the records research, field sampling, and survey data collected to date to support characterization of landfills in the 200-SW-2 Operable Unit (OU). These data supported the Phase I-B data quality objectives (DQO) process (SGW-33253, *Data Quality Objectives Summary Report for the 200-SW-2 Operable Unit Landfills*) for this remedial investigation/feasibility study (RI/FS) work plan. This appendix also contains relevant data collected from other associated projects, such as the M-091 TRU Retrieval Project and the 200-PW-1 OU remedial investigation project. References for each data source are provided within each table. Because these projects collected data that may be of use to the 200-SW-2 OU investigation, the data collected have been captured in this appendix and ultimately will be summarized in the remedial investigation report for evaluation during the remedial investigation/feasibility study process. A discussion of, and reference to, these data is provided in Chapter 3.0 of this RI/FS work plan.

REFERENCES

04-AMCP-0321, 2004, "Transmittal of the Burial Ground Sampling and Analysis Results for January – March 2004," (letter to Michael A. Wilson, Program Manager, Nuclear Waste Program, Department of Ecology, Kennewick, Washington, from Matthew S. McCormick, Assistant Manager for the Central Plateau), U.S. Department of Energy, Richland Operations Office, Richland, Washington, June 4.

CP-13514, 2003, *200-PW-1 Operable Unit Report on Step I Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose Zone Plume*, Rev. 0, Fluor Hanford, Inc., Richland, Washington.

PNNL-00157, 2006, *Soil Measurements at 218-E-2 and E-5 Burial Grounds*, letter report to Greg Berlin, Fluor Hanford, from Andrey Mozhayev, Pacific Northwest National Laboratory, Richland, Washington, September 27.

SGW-32683, in process, *Results from Passive Organic Vapor Sampling, Performed in Selected 200-SW-2 Operable Unit Landfills (218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, and 218-W-5) in June-July 2006*, Fluor Hanford, Inc., Richland, Washington.

SGW-33253, in process, *Data Quality Objectives Summary Report for Landfills in the 200-SW-1 and 200-SW-2 Operable Units*, Fluor Hanford, Inc., Richland, Washington.

SGW-33829, in process, *200-PW-1 Operable Unit Report on Step II Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose-Zone Plume*, Fluor Hanford, Inc., Richland, Washington.

1

Table D-1. Laboratory Results of 218-W-3A Landfill Vent Riser Samples.[a]

Analyte	Chemical Abstracts Service Registry Number	Concentration Detected in Vent Riser Samples (ppmv)			
		Vent Riser T-05-02	Vent Riser T-08-03	Vent Riser T-08-05[b]	Vent Riser T-08-05[b] Duplicate
1,1-Dichloroethene	75-35-4	1.6	N/A	N/A	N/A
1,2-Dichloroethane	107-06-2	0.62	N/A	N/A	N/A
Chloroform	67-66-3	4	N/A	N/A	N/A
Tetrachloroethene (PCE)	127-18-4	3	4,200	18	17
Trichloroethene	79-01-6	1.3	8.8	N/A	N/A

[a]Samples collected in August and September 2005 to support the M-091 Program (SGW-33829, *200-PW-1 Operable Unit Report on Step II Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose-Zone Plume*).

[b]Vapor samples from vent risers T-05-02 and T-08-03 contained the highest volatile organic compound concentrations, based on field screening, in Trenches T-05 and T-08, respectively. An additional SUMMA canister sample and the duplicate sample were collected from vent riser T-08-05.

SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

ppmv = parts per million by volume.

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Table D-2. Laboratory Results of the 218-W-4B Landfill Vent Riser Samples.[a] (2 Pages)

Analyte	Chemical Abstracts Service Registry Number	Concentration Detected in Vent Riser Samples (ppmv)					
		Vent Riser T-07-4		Vent Riser T-07-6		Vent Riser T-07-6[b] Duplicate	
Analytical Results							
Propane	74-98-6	4.6		1.2		5.6	
Methylene chloride	75-09-2	ND		ND		0.72	
1,1-Dichloroethene	75-35-4	5.6		ND		ND	
Carbon tetrachloride	56-23-5	66		42	D	140	D
Chloroform	67-66-3	11		4		9.3	
Tetrachloroethene (PCE)	127-18-4	36		0.99		2	
Trichloroethene (TCE)	79-01-6	8.4		0.44		0.94	
Methanol	67-56-1	53	J	1	J	8.6	DJ
Acetone	67-64-1	86	J	0.78	J	2.3	J
Toluene	108-88-3	ND		ND		0.63	
Ethanol	64-17-5	ND		ND		1.2	
Tentatively Identified Compounds							
Trichlorofluoromethane	75-69-4	ND		2.4		5.9	
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	73		1.4		3.7	
1,1,1-trichloroethane	71-55-6	49		1.7		4.2	

Table D-2. Laboratory Results of the 218-W-4B Landfill Vent Riser Samples.[a] (2 Pages)

Analyte	Chemical Abstracts Service Registry Number	Concentration Detected in Vent Riser Samples (ppmv)					
		Vent Riser T-07-4		Vent Riser T-07-6		Vent Riser T-07-6[b] Duplicate	
Dichlorodifluoromethane	75-71-8			2.6		6.1	
Methylcyclohexane	108-87-2	ND		ND		1.4	
C3 benzene[c]	ND	82		ND		ND	

[a]Samples collected September to November 2006 to support the M-091 Program (SGW-33829, *200-PW-1 Operable Unit Report on Step II Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose-Zone Plume*).

[b]The vapor sample from vent riser T-07-4 contained the highest volatile organic compound concentrations, based on field screening, in Trench T-07. An additional SUMMA canister sample and the duplicate sample were collected from vent riser T-07-6. The additional and duplicate SUMMA canister samples were collected from a vent riser with slightly lower volatile organic compound concentrations to reduce the potential that the highest volatile organic compound concentrations would exceed calibration standards and make the duplicate analysis of little value.

[c]The tentatively identified compound identified as C3 benzene is a three-carbon benzene with high-quality spectral matches with 1,3,5-, 1,2,3-, and 1,2,4-trimethylbenzene. High match qualities also were obtained for the three structures of ethyl methyl benzenes. These compounds often are observed in hydrocarbon mixtures but rarely as an individual tentatively identified compound at a high concentration level.

SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

ND = not detected.
D = analyte was identified at a secondary dilution factor.
J = estimated value.
ppmv = parts per million by volume.

1

Table D-3. Field Screening Results of the 218-W-4C Landfill Vent Riser Samples.* (2 Pages)

Trench Number and Sample Location	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Chloroform (CAS 67-66-3) (ppmv)	Water Vapor (CAS N/A) (ppmv)	HEIS Number
T1-01	2.24	6.80	6400	B14K18
T1-02	2.14	6.34	6370	B14K19
T1-03	1.55	3.31	6410	B14K20
T1-04	1.48	2.87	6560	B14K21
T4-01	7.64	23.2	7530	B14K22
T4-02	8.87	24.0	8060	B14K23
T4-03	852	28.8	7930	B14K24
T4-04	1760	59.3	8270	B14K25
T4-04 Duplicate	1750	59.1	7640	B14K29
T4-04A	812	15.2	11900	B14K46
T4-05	365	7.42	8840	B14K26
T4-05A	8.27	7.53	10500	B14K45
T4-06	8.66	7.83	10600	B14K27

Table D-3. Field Screening Results of the 218-W-4C Landfill Vent Riser Samples.* (2 Pages)

Trench Number and Sample Location	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Chloroform (CAS 67-66-3) (ppmv)	Water Vapor (CAS N/A) (ppmv)	HEIS Number
T4-07	5.21	34.7	11900	B14K28
T4-08	1.12	12.6	9240	B14K30
T4-09	2.81	5.95	9120	B14K31
T4-10	7.87	3.97	10100	B14K32
T4-11	8.04	3.72	10600	B14K33
T4-12	6.61	2.68	10800	B14K34
T4-13	7.74	3.07	11400	B14K35
T4-14	8.80	3.48	12000	B14K36
T4-14 Duplicate	8.80	3.61	11600	B14K39
T4-15	8.66	3.52	13100	B14K37
T4-16	8.43	3.49	13600	B14K38
T7-01	6.27	1.39	7880	B14K40
T7-02	5.98	1.29	7990	B14K41
T7-03	6.68	1.40	8360	B14K42
T7-04	7.58	42.0	8620	B14K43
T7-05	1.0 U	1.81	9150	B14K44

*Samples collected in 2002 to support the M-091 Program (CP-13514, *200-PW-1 Operable Unit Report on Step I Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose Zone Plume*).

CAS = Chemical Abstracts Service registry number.
HEIS = *Hanford Environmental Information System* database.
N/A = not applicable.
ppmv = parts per million by volume.
U = analyzed for but not detected. Value reported is the reporting limit.

Table D-4. Soil Gas Probe Results Near Trench 4 in the 218-W-4C Landfill.*

Location	Depth (ft bgs)	Carbon Tetrachloride (ppmv)	Chloroform (ppmv)
C4056	34.3 – 34.8	< 1.0 – 19.5	< 1.0 – 5.25
C4057	8.9 – 9.4	6.58 – 48.0	< 1.0 – 10.3
C4058	30.5 – 31.0	< 1.0 – 5.52	< 1.0 – 29.3

*Samples collected between 2002 and 2004 to support the 200-PW-1 OU remedial investigation (SGW-33829, *200-PW-1 Operable Unit Report on Step II Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose-Zone Plume*).

bgs = below ground surface.
ppmv = parts per million by volume.

Table D-5. Field Screening Results for Samples Collected From the Vadose Zone in the 218-W-4C Landfill.* (2 Pages)

Borehole Number	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Chloroform (CAS 67-66-3) (ppmv)	Water Vapor (CAS N/A) (ppmv)	HEIS Number
C4011	10.5	2.80	17,500	B154R1
C4011	6.91	2.07	14,500	B154R0
C4012	62.1	12.2	18,100	B154T3
C4012	7.25	2.32	19,500	B154R3
C4012	15.6	4.10	15,700	B154R2
C4017	1.0 U	1.41	19,700	B154T6
C4017	1.0 U	1.72	18,200	B154T5
C4014	1.0 U	1.07	17,500	B154R7
C4014	1.36	1.85	15,800	B154R6
C4019	1.0 U	1.55	17,900	B154V0
C4019	1.0 U	2.57	15,500	B154T9
C4022	1.0 U	1.56	19,000	B154V6
C4022	2.4	2.78	16,700	B154V5
C4018	1.0 U	1.16	18,700	B154T8
C4018	1.0 U	1.50	17,200	B154T7
C4021	1.0 U	1.62	20,300	B154V4
C4021	1.0 U	1.83	17,700	B154V3
C4015	1.0 U	2.09	13,900	B154R9
C4015	1.0 U	2.31	14,100	B154R8
C4020	1.0 U	1.47	19,800	B154V2
C4020	1.0 U	1.52	16,600	B154V1
C4013	1.0 U	1.0 U	19,200	B154R5
C4013	1.0 U	1.08	16,300	B154R4
C4016	12.7	5.77	14,000	B154T2
C4016	14.8	4.48	16,200	B154T1
C4016	14.3	4.51	16,200	B154T4 Duplicate
C4016	4.80	3.37	15,600	B154T0
C3869	9.61	3.12	13,400	B15J55
C3869	16.0	5.08	14,300	B15J56
C3869	12.9	4.40	14,700	B15J57
C3869	14.0	5.63	16,400	B15J58
C3869	11.3	4.75	15,800	B15J59
C3866	1.0 U	1.0 U	10,400	B15J37
C3866	1.0 U	1.0 U	10,400	B15J38
C3866	1.0 U	1.0 U	10,100	B15J39

Table D-5. Field Screening Results for Samples Collected From the Vadose Zone in the 218-W-4C Landfill.* (2 Pages)

Borehole Number	Carbon Tetrachloride (CAS 56-23-5) (ppmv)	Chloroform (CAS 67-66-3) (ppmv)	Water Vapor (CAS N/A) (ppmv)	HEIS Number
C3866	1.0 U	1.0 U	9,810	B15J40
C3866	1.0 U	1.0 U	9,890	B15J41
C3866	1.0 U	1.0 U	9,870	B15J42
C3867	45.8	9.53	16,100	B15J43
C3867	47.6	9.59	15,700	B15J49 Duplicate
C3867	7.34	1.71	10,600	B15J44
C3867	14.9	3.64	13,100	B15J45
C3867	23.9	5.48	14,200	B15J46
C3867	35.8	8.30	18,900	B15J47
C3867	24.9	6.77	22,200	B15J48
C3868	5.23	3.13	19,800	B15J50
C3868	3.95	3.98	22,100	B15J51
C3868	4.88	3.88	23,300	B15J52
C3868	7.26	4.24	21,000	B15J53
C3868	8.73	4.27	24,200	B15J54
C3865	1.0 U	1.0 U	18,800	B15J30
C3865	1.0 U	1.13	20,900	B15J31
C3865	1.0 U	1.28	19,500	B15J32
C3865	3.49	1.90	21,600	B15J33
C3865	6.20	2.13	22,400	B15J34
C3865	6.19	2.10	22,400	B15J36 Duplicate
C3865	1.95	1.73	27,900	B15J35
C3870	3.58	2.11	12,000	B15J60
C3870	5.13	2.99	11,800	B15J61
C3870	5.15	3.11	11,900	B15J62
C3870	6.37	3.67	12,300	B15J63
C3870	6.15	3.93	14,500	B15J64
C3870	6.12	3.71	14,400	B15J65 Duplicate

*Samples collected in 2002 to support the 200-PW-1 OU remedial investigation (CP-13514, *200-PW-1 Operable Unit Report on Step I Sampling and Analysis of the Dispersed Carbon Tetrachloride Vadose Zone Plume*).

CAS = Chemical Abstracts Service registry number.
HEIS = *Hanford Environmental Information System* database.
N/A = not applicable.
U = analyzed for but not detected. Value reported is the reporting limit.

Table D-6. Laboratory Analysis of 218-W-4C Landfill Vent Riser Samples.[a] (2 Pages)

Analyte	CAS Number	Concentration Detected in Vent Riser Samples (ppbv)						
		Vent Riser T1-04	Vent Riser T4-04	Vent Riser T4-04 duplicate	Vent Riser T7-06	Vent Riser T20-03	Vent Riser T29-01-S[b]	Vent Riser T29-04-N[b]
1-Chlorobutane[c]	109-69-3	ND	ND	ND	ND	ND	ND	280
1,1-Dichloroethane[c]	75-34-3	ND	ND	ND	ND	ND	16	ND
1,1,1-Trichloroethane[c]	71-55-6	110	ND	ND	40	ND	68	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	76-13-1	ND	ND	ND	44	ND	ND	ND
1,2-Dichloroethane	107-06-2	ND	ND	ND	ND	ND	13	ND
1-Butanol	71-36-3	ND	320,000 D	ND	ND	ND	12	ND
2-Butanone	78-93-3	ND	ND	ND	ND	ND	46	31
3-Methylhexane	589-34-4	ND	ND	ND	ND	ND	78	ND
Acetaldehyde	75-07-0	ND	ND	ND	22	15 B	ND	70
Acetic acid, methylester[c]	79-20-9	ND	ND	ND	ND	ND	29	ND
Acetone	67-64-1	ND	ND	ND	14	ND	220	140
Acetonitrile	75-05-8	ND	ND	ND	ND	ND	ND	17
Benzene	71-43-2	ND	ND	ND	ND	ND	33	19
Carbon Tetrachloride	56-23-5	16	ND	ND	2,700 D	18	3,400 D	1,900 D
Choroethane	75-00-3	ND	ND	ND	21	ND	180	87
Chloroform	67-66-3	ND	ND	ND	95	ND	75	40
Chloromethane	74-87-3	ND	ND	ND	ND	ND	730 D	220
Dichlorodifluoromethane	75-71-8	NA	NA	NA	NA	910 D	NA	NA
Ethanol	64-17-5	ND	ND	ND	ND	ND	ND	23
Methanol	67-56-1	ND	ND	ND	ND	ND	430 D	230
Methylene Chloride	75-09-2	51	ND	ND	ND	ND	110	59
n-Heptane	142-82-5	ND	ND	ND	ND	ND	19	11
n-Butane	106-97-8	20	ND	ND	ND	ND	66	25

Table D-6. Laboratory Analysis of 218-W-4C Landfill Vent Riser Samples.[a] (2 Pages)

Analyte	CAS Number	Concentration Detected in Vent Riser Samples (ppbv)						
		Vent Riser T1-04	Vent Riser T4-04	Vent Riser T4-04 duplicate	Vent Riser T7-06	Vent Riser T20-03	Vent Riser T29-01-S[b]	Vent Riser T29-04-N[b]
Tetrachloroethene	127-18-4	25,000 D	14,000,000 D	6,200,000 D	36,000 D	ND	2,400 D	2,800 D
Toluene	108-88-3	ND	ND	ND	ND	ND	16	ND
Trichloroethene	79-01-6	16	ND	ND	21	ND	ND	ND
Trichloromonofluoromethane	75-69-4	800 D	ND	ND	7,900 D	8,600 D	ND	ND
Vinyl Chloride	75-01-4	ND	ND	ND	ND	ND	17	ND

[a]Samples collected in 2003 to support the M-091 Program (04-AMCP-0321, "Transmittal of the Burial Ground Sampling and Analysis Results for January – March 2004").

[b]A SUMMA canister sample was collected from vent riser T29-04-N in Trench T-29 on October 21, 2003. However, the maximum carbon tetrachloride concentration in Trench T-29 was detected at vent riser T29-01-S. A second SUMMA canister sample was collected in Trench T-29 from vent riser T29-01-S on October 22, 2003, to correct this unintentional mistake. Both of these SUMMA canister samples were submitted for laboratory analysis.

[c]Tentatively identified compound.

SUMMA is a trademark of Moletrics, Inc., Cleveland, Ohio.

B = analyte found in associated blank.
CAS = Chemical Abstracts Service registry number.
D = analyte was identified at a secondary dilution factor.
NA = not analyzed.
ND = not detected.
ppbv = parts per billion by volume.

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
Trench T04		
T04-A-1	1,1,1-Trichloroethane	103
	Benzene	36
	Tetrachloroethene	1113
	Trichloroethene	60
T04-B-1	1,1,1-Trichloroethane	296
	Benzene	65
	Tetrachloroethene	431
T04-B-2	1,1,1-Trichloroethane	152
	1,1-Dichloroethene	91
	Tetrachloroethene	480
T04-C-1	1,1,1-Trichloroethane	375
	1,1-Dichloroethene	80
	Benzene	34
	Tetrachloroethene	170
T04-C-2	1,1,1-Trichloroethane	149
	Benzene	32
	Tetrachloroethene	147
Trench T05		
T05-A-1	1,1,1-Trichloroethane	218
	Benzene	33
	Tetrachloroethene	76
T05-B-1	1,1,1-Trichloroethane	544
	1,1-Dichloroethane	1057
	1,1-Dichloroethene	80
	1,2-Dichloroethane	80
	Benzene	37
	Chloroform	160
	Tetrachloroethene	570
T05-C-1	1,1,1-Trichloroethane	208
	Benzene	32
	Chloroform	69
	Tetrachloroethene	1123
	Trichloroethene	40
T05-C-1D	1,1,1-Trichloroethane	155
	Benzene	36
	Chloroform	43
	Tetrachloroethene	616

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
T05-D-1	1,1,1-Trichloroethane	56
	Benzene	59
	Tetrachloroethene	1262
	Trichloroethene	27
T05-D-2	1,1,1-Trichloroethane	86
	Tetrachloroethene	118
T05-D-3	1,1,1-Trichloroethane	509
	Benzene	51
	Tetrachloroethene	1025
T05-D-4	1,1,1-Trichloroethane	293
	Benzene	29
	Chloroform	40
	Tetrachloroethene	806
T05-E-1	1,1,1-Trichloroethane	591
	1,1-Dichloroethane	101
	1,1-Dichloroethene	163
	Chloroform	388
	Tetrachloroethene	328
T05-F-1	1,1,1-Trichloroethane	11754
	1,1-Dichloroethane	1171
	1,1-Dichloroethene	2712
	1,2-Dichloroethane	1980
	Benzene	72
	Chloroform	9370
	Tetrachloroethene	1250
	Trichloroethene	89
Trench T12		
T12-A-1	1,1,1-Trichloroethane	191
	1,1-Dichloroethene	51
	Tetrachloroethene	38
T12-B-1	1,1,1-Trichloroethane	40
	Benzene	29
	Tetrachloroethene	606
	Toluene	29
T12-C-1	1,1,1-Trichloroethane	148
	Benzene	43
	Tetrachloroethene	2495
	Trichloroethene	40

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
T12-C-2	Tetrachloroethene	639
	Trichloroethene	29
Trench T19		
T19-A-1	1,1,1-Trichloroethane	754
	1,1-Dichloroethane	39
	1,1-Dichloroethene	178
	Benzene	43
	Tetrachloroethene	1593
	Trichloroethene	50
Trench T20		
T20-A-1	1,1,1-Trichloroethane	534
	1,1-Dichloroethene	26
	Benzene	26
	Tetrachloroethene	215
T20-A-2	1,1,1-Trichloroethane	256
	Benzene	46
	Tetrachloroethene	199
Trench T22		
T22-A-1	1,1,1-Trichloroethane	408
	1,1-Dichloroethene	40
	Benzene	60
	Chloroform	42
	Tetrachloroethene	20457
	Trichloroethene	342
T22-A-2	1,1,1-Trichloroethane	167
	Benzene	43
	Tetrachloroethene	10456
	Trichloroethene	223
Trench T24		
T24-A-1	1,1,1-Trichloroethane	72
	Benzene	53
	Tetrachloroethene	1353
T24-A-2	1,1,1-Trichloroethane	72
	Benzene	37
	Tetrachloroethene	461
Trench T29		
T29-A-1	1,1,1-Trichloroethane	126
	Benzene	53
	Tetrachloroethene	68

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
T29-A-2	1,1,1-Trichloroethane	105
	Benzene	52
	Tetrachloroethene	101
T29-B-1	1,1,1-Trichloroethane	251
	1,1-Dichloroethene	38
	Benzene	38
	Chloroform	37
	Tetrachloroethene	350
T29-B-2	1,1,1-Trichloroethane	294
	Benzene	44
	Carbon Tetrachloride	32
	Chloroform	33
	Tetrachloroethene	426
T29-B-2D	1,1,1-Trichloroethane	193
	1,1-Dichloroethene	50
	Benzene	27
	Tetrachloroethene	277
T29-C-1	1,1,1-Trichloroethane	382
	1,1-Dichloroethene	99
	Benzene	31
	Tetrachloroethene	222
T29-C-2	1,1,1-Trichloroethane	295
	1,1-Dichloroethene	63
	Tetrachloroethene	131
Trench T31		
T31-A-1	1,1,1-Trichloroethane	56
	Benzene	34
	Tetrachloroethene	60
T31-A-2	1,1,1-Trichloroethane	57
	Benzene	39
	Tetrachloroethene	144
T31-B-1	1,1,1-Trichloroethane	74
	1,1-Dichloroethene	26
	Tetrachloroethene	286
T31-B-2	1,1,1-Trichloroethane	590
	Benzene	58
	Carbon Tetrachloride	29
	Tetrachloroethene	819

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
T31-C-1	1,1,1-Trichloroethane	247
	Benzene	47
	Tetrachloroethene	51
T31-C-2	1,1,1-Trichloroethane	622
	Benzene	70
	Tetrachloroethene	254
Trench T32		
T32-A-1	1,1,1-Trichloroethane	185
	Benzene	45
	Tetrachloroethene	63
Trench T33		
T33-A-1	1,1,1-Trichloroethane	511
	Benzene	33
	Tetrachloroethene	232
T33-B-1	1,1,1-Trichloroethane	270
	1,1-Dichloroethane	80
	1,1-Dichloroethene	65
	Benzene	33
	Chloroform	36
	Tetrachloroethene	125
Trench T34		
T34-A-1	1,1,1-Trichloroethane	205
	1,1-Dichloroethene	32
	Benzene	31
	Tetrachloroethene	523
Trench T35		
T35-A-1	1,1,1-Trichloroethane	251
	1,2-Dichloroethane	25
	Benzene	29
	Chloroform	225
	Tetrachloroethene	742
Trench T41		
T41-A-1	1,1,1-Trichloroethane	179
	Benzene	35
	Tetrachloroethene	83
Trench T44		
T44-A-1	1,1,1-Trichloroethane	34
	Benzene	25
T44-A-2	1,1,1-Trichloroethane	79
	Tetrachloroethene	32

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
T44-B-1	1,1,1-Trichloroethane	72
	Benzene	46
T44-B-2	1,1,1-Trichloroethane	40
	Benzene	27
Trench T46		
T46-A-1	1,1,1-Trichloroethane	2828
	1,1-Dichloroethane	553
	1,1-Dichloroethene	490
	Benzene	28
	Tetrachloroethene	382
T46-A-2	1,1,1-Trichloroethane	1204
	1,1-Dichloroethane	182
	1,1-Dichloroethene	186
	Benzene	37
	Tetrachloroethene	61
T46-A-2D	1,1,1-Trichloroethane	1352
	1,1-Dichloroethane	188
	1,1-Dichloroethene	381
	Benzene	27
T46-B-1	1,1,1-Trichloroethane	230
	1,1-Dichloroethene	58
	Benzene	39
	Tetrachloroethene	230
T46-C-1	1,1,1-Trichloroethane	510
	1,1-Dichloroethane	111
	1,1-Dichloroethene	41
	Benzene	39
	Tetrachloroethene	27
T46-C-2	1,1,1-Trichloroethane	259
	1,1-Dichloroethane	90
	1,1-Dichloroethene	117
	Benzene	26
	Tetrachloroethene	32
Trench T48		
T48-A-1	1,1,1-Trichloroethane	31
	Benzene	29
T48-A-3	1,1,1-Trichloroethane	147
	Benzene	27
T48-B-1	Benzene	34

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
Trench T50		
T50-1	1,1,1-Trichloroethane	35
	Benzene	29
T50-A-1	1,1,1-Trichloroethane	79
	Benzene	25
Trench TS1		
TS1-A-1	1,1,1-Trichloroethane	11693
	1,1-Dichloroethane	4025
	1,1-Dichloroethene	938
	Benzene	53
	Chloroform	57
	Tetrachloroethene	107
	Toluene	25
TS1-A-2	1,1,1-Trichloroethane	2025
	1,1-Dichloroethane	684
	1,1-Dichloroethene	638
	Chloroform	186
	Tetrachloroethene	148
Trench TS3		
TS3-A-1	Benzene	45
TS3-A-2	Benzene	33
	Tetrachloroethene	83
TS3-A-3	Benzene	31
TS3-A-4	Tetrachloroethene	192
TS3-A-5	Benzene	78
	Tetrachloroethene	130
TS3-A-6	1,1,1-Trichloroethane	32
	Benzene	57
TS3-A-7	Tetrachloroethene	78
TS3-A-8	1,1,1-Trichloroethane	26
	Tetrachloroethene	38
TS3-A-9	Benzene	29
	Tetrachloroethene	47
TS3-A-10	1,1,1-Trichloroethane	85
	Tetrachloroethene	142
TS3-A-11	1,1,1-Trichloroethane	62
	Benzene	42
	Carbon Tetrachloride	26
	Chloroform	36
	Tetrachloroethene	32

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
TS3-A-12	1,1,1-Trichloroethane	68
	Carbon Tetrachloride	149
	Chloroform	241
	Tetrachloroethene	96
TS3-A-13	1,1,1-Trichloroethane	27
	Benzene	28
TS3-A-14	1,1,1-Trichloroethane	46
	Benzene	30
	Tetrachloroethene	73
TS3-A-15	1,1,1-Trichloroethane	80
	Benzene	32
TS3-A-16	1,1,1-Trichloroethane	100
	1,1,2-Trichlorotrifluoroethane	412
	Benzene	42
	Tetrachloroethene	40
TS3-A-17	Benzene	34
TS3-A-17D	1,1,1-Trichloroethane	37
TS3-A-18	Benzene	30
	Tetrachloroethene	25
TS3-A-19	Benzene	30
Trench TS6		
TS6-A-1	Benzene	28
	Tetrachloroethene	97
TS6-A-2	Tetrachloroethene	72
TS6-A-3	Benzene	55
	Tetrachloroethene	116
TS6-A-4	Benzene	61
	Chloroform	52
	Tetrachloroethene	36
TS6-B-1	Tetrachloroethene	94
TS6-B-2	Tetrachloroethene	58
TS6-B-3	Benzene	31
	Tetrachloroethene	91
TS6-B-4	Benzene	37
TS6-C-1	1,1,1-Trichloroethane	34
	Chloroform	76
	Tetrachloroethene	35

Table D-7. Summary of Passive Soil-Gas Survey Data for the 218-W-3A Landfill.* (9 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
TS6-C-2	1,1,1-Trichloroethane	45
	Benzene	38
	Chloroform	61
	Tetrachloroethene	26
Trench TS8		
TS8-A-1	1,1,1-Trichloroethane	133
	Benzene	25
	Tetrachloroethene	70070
	Trichloroethene	608
TS8-A-2	1,1,1-Trichloroethane	58
	Benzene	28
	Tetrachloroethene	706
Trench TS9		
TS9-A-1	1,1,1-Trichloroethane	164
	1,1-Dichloroethane	134
	Benzene	43
	Carbon Tetrachloride	1184
	Chloroform	1200
	Tetrachloroethene	295

*Samples collected in June and July 2006 to support the 200-SW-2 OU remedial investigation (SGW-32683, *Results from Passive Organic Vapor Sampling, Performed in Selected 200-SW-2 Operable Unit Landfills (218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, and 218-W-5) in June-July 2006*).

ng/sample = nanograms/sample.

Table D-8. Summary of Soil-Gas Survey Data for the 218-W-3AE Landfill.* (3 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
Trench T05		
T05-G-1	1,1,2-Trichlorotrifluoroethane	13788
	Benzene	43
T05-G-2	Benzene	36
T05-G-3	1,1,2-Trichlorotrifluoroethane	482
	Benzene	26
T05-G-5	Benzene	48
T05-G-5D	1,1,2-Trichlorotrifluoroethane	227
	Benzene	48
T05-G-6	Benzene	32
T05-G-7	1,1,2-Trichlorotrifluoroethane	446
	Benzene	44
T05-G-8	Benzene	29
T05-H-1	Benzene	25

Table D-8. Summary of Soil-Gas Survey Data for the 218-W-3AE Landfill.* (3 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
T05-H-2	Benzene	26
T05-H-3	1,1,1-Trichloroethane	33
T05-H-4	Benzene	42
T05-H-5	Benzene	50
T05-H-6	Tetrachloroethene	30
T05-H-7	1,1,1-Trichloroethane	31
	Benzene	34
	Tetrachloroethene	139
T05-H-8	1,1,1-Trichloroethane	40
	Benzene	26
	Tetrachloroethene	32
T05-H-8D	Tetrachloroethene	142
T05-H-9	Benzene	36
Trench T08		
T08-A-1	1,1,1-Trichloroethane	1894
	1,1,2-Trichlorotrifluoroethane	1082
	1,1-Dichloroethane	63
	1,1-Dichloroethene	123
	Benzene	40
	Tetrachloroethene	373
Trench T10		
T10-A-2	1,2,4-Trimethylbenzene	27
	Benzene	55
T10-A-3	Benzene	54
T10-A-4	Benzene	32
T10-A-5	Benzene	32
T10-A-6	Benzene	31
T10-A-8	1,1,1-Trichloroethane	50
	1,1,2-Trichlorotrifluoroethane	797
	Benzene	33
T10-A-9	1,1,1-Trichloroethane	54
	1,1,2-Trichlorotrifluoroethane	5870
	Benzene	38
T10-A-10	1,1,1-Trichloroethane	87
	1,1,2-Trichlorotrifluoroethane	2212
	Benzene	40
	Tetrachloroethene	62

Table D-8. Summary of Soil-Gas Survey Data for the 218-W-3AE Landfill.* (3 Pages)

Sample Location	Organic Compounds	Analytical Results (ng/sample)
T10-A-11	1,1,1-Trichloroethane	29
	1,1,2-Trichlorotrifluoroethane	793
	Benzene	26
	Tetrachloroethene	30
T10-A-12	1,1,1-Trichloroethane	622
	1,1,2-Trichlorotrifluoroethane	8059
	1,1-Dichloroethane	102
	1,2-Dichloropropane	92
	Benzene	88
	Chloroform	58
	Tetrachloroethene	51
T10-A-13	1,1,1-Trichloroethane	42
	1,1,2-Trichlorotrifluoroethane	5534
T10-A-14	1,1,1-Trichloroethane	87
	1,1,2-Trichlorotrifluoroethane	6949
	Benzene	35
T10-A-15	1,1,1-Trichloroethane	273
	1,1,2-Trichlorotrifluoroethane	1813
	1,1-Dichloroethene	169
	Benzene	29
T10-A-16	1,1,1-Trichloroethane	85
	1,1,2-Trichlorotrifluoroethane	794
	1,1-Dichloroethene	27
	Benzene	39
T10-A-17	1,1,1-Trichloroethane	118
	1,1,2-Trichlorotrifluoroethane	1187
	Tetrachloroethene	64
	Trichloroethene	846
T10-A-18	1,1,1-Trichloroethane	70
	1,1,2-Trichlorotrifluoroethane	423
	Benzene	95
	Trichloroethene	30
T10-B-1	1,1,1-Trichloroethane	21153
	1,1-Dichloroethane	3386
	1,1-Dichloroethene	965
	Benzene	37
	Tetrachloroethene	145911
	Trichloroethene	483

*Samples collected in June and July 2006 to support the 200-SW-2 OU remedial investigation (SGW-32683, *Results from Passive Organic Vapor Sampling, Performed in Selected 200-SW-2 Operable Unit Landfills (218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, and 218-W-5) in June-July 2006*).

ng/sample = nanograms/sample.

1

Table D-9. Summary of Soil-Gas Survey Data for the 218-W-4B Landfill.*

Sample Location	Organic Compounds	Analytical Results (ng/sample)
Trench T08		
T-08-1A	1,1,1-Trichloroethane	1224
	1,1-Dichloroethane	166
	1,1-Dichloroethene	313
	1,2-Dichloropropane	1402
	Benzene	54
	Carbon Tetrachloride	87204
	Chloroform	7220
	Tetrachloroethene	230
	Trichloroethene	387
T08-A-1	1,1,1-Trichloroethane	778
	1,1-Dichloroethene	315
	1,2-Dichloropropane	1177
	Benzene	26
	Carbon Tetrachloride	70396
	Chloroform	6762
	Tetrachloroethene	110
	Trichloroethene	284
T08-A-2	Benzene	62
	Carbon Tetrachloride	30
T08-A-3	1,1,1-Trichloroethane	720
	1,1-Dichloroethane	73
	1,1-Dichloroethene	82
	1,2-Dichloropropane	486
	Benzene	43
	Carbon Tetrachloride	33091
	Chloroform	3070
	Tetrachloroethene	115
	Trichloroethene	369
T08-A-4	1,1,1-Trichloroethane	731
	1,1-Dichloroethane	97
	1,1-Dichloroethene	156
	1,2-Dichloropropane	2096
	Benzene	28
	Carbon Tetrachloride	79082
	Chloroform	5742
	Tetrachloroethene	232
	Trichloroethene	351

*Samples collected in June and July 2006 to support the 200-SW-2 OU remedial investigation (SGW-32683, *Results from Passive Organic Vapor Sampling, Performed in Selected 200-SW-2 Operable Unit Landfills (218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, and 218-W-5) in June-July 2006*).

ng/sample = nanograms/sample.

2

Table D-10. Summary of Soil-Gas Survey Data for the 218-W-4C Landfill.*

Sample Location	Organic Compounds	Analytical Results (ng/sample)
Trench T19		
T19-A	Benzene	54
	Chloroform	30
	Toluene	25
T19-B-1	Benzene	36
T19-B-2	Benzene	32
T19-B-3	1,1,1-Trichloroethane	40
Trench T23		
T23-A-1	1,1,1-Trichloroethane	2003
	1,1-Dichloroethane	53
	1,1-Dichloroethene	79
	Benzene	35
Trench T58		
T58-A-1	1,1,1-Trichloroethane	88
	Benzene	36
	Tetrachloroethene	79
T58-A-1D	1,1,1-Trichloroethane	37
	Benzene	37
	Tetrachloroethene	57
T58-B-1	1,1,1-Trichloroethane	605
	1,1-Dichloroethene	48
	Benzene	54
	Tetrachloroethene	30

*Samples collected in June and July 2006 to support the 200-SW-2 OU remedial investigation (SGW-32683, *Results from Passive Organic Vapor Sampling, Performed in Selected 200-SW-2 Operable Unit Landfills (218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, and 218-W-5) in June-July 2006*).

ng/sample = nanograms/sample.

2

1

Table D-11. Summary of Soil-Gas Survey Data for the 218-W-5 Landfill.*

Sample Location	Organic Compounds	Analytical Results (ng/sample)
Trench T22		
T22-A-1	1,1,1-Trichloroethane	188
	Benzene	47
	Tetrachloroethene	78
T22-A-2	1,1,1-Trichloroethane	1020
	1,1-Dichloroethane	84
	1,1-Dichloroethene	190
	Benzene	37
	Tetrachloroethene	250
T22-B-1	1,1,1-Trichloroethane	2310
	1,1,2-Trichlorotrifluoroethane	410
	1,1-Dichloroethane	159
	1,1-Dichloroethene	470
	Benzene	35
	Tetrachloroethene	2621
	Trichloroethene	49

*Samples collected in June and July 2006 to support the 200-SW-2 OU remedial investigation (SGW-32683, *Results from Passive Organic Vapor Sampling, Performed in Selected 200-SW-2 Operable Unit Landfills (218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, and 218-W-5) in June-July 2006*).
ng/sample = nanograms/sample.

2

Table D-12. Radiological Survey Results for 218-E-2 and 218-E-5 Landfills.* (2 Pages)

Location	Cs-137 Concentration [pCi/g]ND Measured value ± 1 sigma {Minimum Detectable Levels}	
	First Model (1' clean layer A + 6" Cs-137 in B)	Second Model (6" Cs-137 in layer A)
1	123 ± 9 {18}	0.68 ± 0.05 {0.10}
2	1698 ± 65 {24}	9.38 ± 0.37 {0.13}
3	1280 ± 50 {20}	7.07 ± 0.28 {0.11}
4	822 ± 33 {19}	4.54 ± 0.19 {0.10}
5	1200 ± 47 {20}	6.62 ± 0.27 {0.11}
6	1542 ± 59 {22}	8.52 ± 0.34 {0.12}
7	1059 ± 42 {20}	5.84 ± 0.24 {0.11}
8	1535 ± 61 {28}	8.48 ± 0.35 {0.16}
9	132 ± 9 {16}	0.73 ± 0.05 {0.09}

Table D-12. Radiological Survey Results for 218-E-2 and 218-E-5 Landfills.* (2 Pages)

Location	Cs-137 Concentration [pCi/g]ND	
	Measured value ± 1 sigma {Minimum Detectable Levels}	
	First Model (1' clean layer A + 6" Cs-137 in B)	Second Model (6" Cs-137 in layer A)
A	1717 ± 71 {36}	9.48 ± 0.41 {0.20}
B	1686 ± 70 {42}	9.31 ± 0.40 {0.23}
C	1132 ± 50 {35}	6.25 ± 0.28 {0.19}

*Data collected in September 2006 to support the 200-SW-2 OU remedial investigation (PNNL-00157, *Soil Measurements at 218-E-2 and E-5 Burial Grounds*).

ND Concentration values are based on the model applied for analysis and reported uncertainty does not include systematic component of the model accuracy.

Table D-13. Plutonium and Uranium Estimates in 200-SW-2 Operable Unit Landfills. (2 Pages)

Landfill	Size (acres)	Estimated Total Plutonium Inventory (g)	Estimated Plutonium Inventory (g/ac)	Estimated Total Uranium Inventory (g)	Estimated Uranium Inventory (g/ac)
218-C-9	1.25	0	0	0	0
218-E-1	3.24	900	278	400,000	123,574
218-E-2	5.49	800	146	300,000	54,678
218-E-2A	1.07	--	--	--	--
218-E-4	3.58	10	3	1,000	279
218-E-5	2.44	623	255	120,001	49,116
218-E-5A	1.1	1,380	1,258	120,000	109,356
218-E-8	1.06	20	19	2,000	1,894
218-E-9	0.98	--	--	--	--
218-E-10	70.16	4,942	70	801,015	11,418
218-E-12A	28.24	8,931	316	994,740	35,228
218-E-12B	217.17	1,393	6	7,640	35
218-W-1	6.34	94,030	14,840	700,000	110,478
218-W-1A	14.97	2,000	134	900,000	60,129
218-W-2	7.05	126,010	17,879	1,400,000	198,645
218-W-2A	20.39	6,385	313	2,690,000	131,955
218-W-3	8.08	68,240	8,445	79,798,801	9,875,102
218-W-3A	56.93	552	10	634,186	11,139
218-W-3AE	61.29	122	2	439,222	7,166
218-W-4A	21.01	35,386	1,684	393,806,555	18,743,767
218-W-4B	9.34	8,977	961	21,568	2,308
218-W-4C	44.08	26	1	214,777	4,873

Table D-13. Plutonium and Uranium Estimates in 200-SW-2 Operable Unit Landfills. (2 Pages)

Landfill	Size (acres)	Estimated Total Plutonium Inventory (g)	Estimated Plutonium Inventory (g/ac)	Estimated Total Uranium Inventory (g)	Estimated Uranium Inventory (g/ac)
218-W-5	90.91	166	2	6,914,968	76,065
218-W-11	2.3	--	--	--	--

g = grams.
g/ac = grams per acre.
-- = unknown quantity.

1

Table D-14. 200-SW-2 Operable Unit Landfill Inventories. (5 Pages)

Landfill	Items Known to be Disposed
218-C-9	Absorbent, Air Conditioners, Aluminum, Asbestos, Asbestos Covered Pipe, Asbestos Piping And Duct, Asphalt, Blacktop, Cardboard, Cardboard, Cement, Chain Link Fence, Cloth, Concrete, Concrete, Concrete Metal, Contaminated Soil, Cut Pipe, Diatomaceous Earth, Dirt, Drums Soil, Dump Trucks Soil, Electric Motors, Fiberglass, Floor Sweep, Floor Sweeps, Foam, Galvanized, Galvanized Metal Gutters, Glass, Greenhouse, Hay, HEPA Filter, Iron, Kitty Litter, Leather, Leather, Lumber, Metal, Metal Brackets, Metal Demolition Debris, Metal Doors, Metal Foam Wood Poles, Metal Pipe, Nylon, Packages of Transite Sheeting Asbestos, Paper, Paper & Plastic In A Steel Box, Pipe, Piping, Plastic, Plastic And Weeds In DOT 55-Gal Drums, Plastic Foam, Plastic Rubber, Plywood, Polyurethane, Pyrofoam, Rags, Rubber, Rubber, Sample Pump, Sand, Sheet Metal Ducts, Soil, Soil & Plastic In Metal Box, Soil In Drums, Soil Packaged In One-Lb Metal Cans, Stainless Steel, Stainless Steel And Aluminum, Stainless Steel Metal Doors, Stainless Steel Pulsar Columns, Stainless Tanks, Standard Boxes Paper, Steel, Steel Beams And Channel, Straw, Structural Steel Pipe Gallery, Styrofoam, Sweeping Compound, Transite Asbestos, Tumbleweeds, Tumbleweeds - Self-Contained, Tumbleweeds, Tumbleweeds Delivered In A Compactor Truck, Tumbleweeds In Plastic Wrap, Vermiculite, Weeds, Weeds In Plastic Wrap, Wood, Wood Demolition Debris, Wood Piles, Wood Poles, Wood Poles W/ Metal Brackets, Wood Power Poles, Wood Telephone Poles
218-E-1	154 B Connector, 18-3 tank lid, 7-4 Sampling assembly, 75 ton crane hook cable, Decontamination pot, Dissolver yoke, GE Tube for Section 14, Precipitator Yoke # 63065, Pressure gauge, Sec. 13 Connector 32, Sec. 18 Connector 2-37, Stainless steel pipe, Assault masks, Dissolver buckets, Pipe flanges, Spray nozzles, Chemox face piece, Dissolver bucket yokes, Cell drain blocks, Sample stand pipes, Bucket from Cask Assembly #190
218-E-2	No data
218-E-2A	No data
218-E-4	No data
218-E-5	H-2 Purex column, Purex FA1 filter, Purex L Cell Concentrator (complete), Purex offgas heater, Purex Process Solution Pump, J2 Purex pulse column, Purex 2-1-A Ventilation Fans of Carbon Steel, Purex Silver Reactors, Purex Waste Concentrator Heat Exchanger Tube Bundles, misc equipment from tank farm recovery program
218-E-5A	Purex J2-Column package, Purex K2-Column package, Purex L-Cell package, Boxes contained Purex L cell package, K-2 tower and J-2 tower, boxes of misc. cell equipment
218-E-8	No data
218-E-9	No data
218-E-10	Wood Roofing, Wood And Roofing, Wood, WESF Drums, Waste From Trap Pit #5 Reading Over 1000 C/ft3, Waste From Trap Pit #2, Waste From Membrane Filter Press., Waste From 225-B In Drums Out Of Cell 4, Waste Drums From 225-B, Waste Drums, Waste Boxes, Valves, Two Tube Bundles #63 And 68, Two Purex Tube Bundles H4 & F-11, Two Purex Tube Bundles F6 & 11, Two Hood Panels From Z Plant In Std Concrete Burial Box, Tumbleweeds, Tube Bundles, Terra Cotta, T-18-2 Column, Steel Spacers, Steel Roll Door, Steel Overpacks, Steel Low-Boy Trailer With Wooden Box, Stainless Steel, Spacers, Soil, Sieve Plate And Misc. Small Items, Scrubbers, Scrap Metal From 221-T Canyon, Sand & Gravel From A-Farm Complex Fence Line, Sampler, Rudy Cart, Rubble, Rubber, Roofing, Resin TK From 18-2 Tank, Resin Tank And Filter, Railroad Rail With Two Wheel Stops, Radiation Waste Boxes, Purex L-I Column, Purex HC Column, Purex FA-1 Filter, Purex Cover Blocks, Purex Centrifuge Blocks, Pumps F-22-5 Filters, Pumps, Pump-Agitator, PRTR Connecters, PPE, Plywood Boxes, Plastic Liner Inside Concrete Box, Plastic Liner and Absorbent Materials With Plywood Boxes, Plastic Liner, Plastic, Planks, PDR RHO-82-359 2-Concentrator, Parts For 2 Pumps, Paper, P-25-2 Pumps, Old Pr Cans, Non-Containerized Tumbleweeds Collected In Compactor Truck, Misc. Small Tools, Misc. Dry High Dose Rate B-G Contaminated Failed Equipment From the Purex Canyon, Misc Purex Canyon Waste Including Piping, Misc Jumpers and Rags From Canyon, Misc High Level Waste Consisting Of Failed Canyon Jumpers and Metal Items All Dry, Misc Failed Equipment, Misc Dry Waste, Misc Dry High Rate B-G Waste, Misc Contaminated Equipment, Misc Canyon Waste, Misc Canyon Trash, Metal, Mark I Type Wrapped In Plastic And Loose Packed Metal Basin Debris, LLW Soil From 3707D Facility In 300 Area, LLW, Lead Shielding, Laundry Bags, Laundry And Barrels From 225-B (Misc), Laundry, Lard Cans, L-9 Vessel And Piping, Key Block Off Of Cell 39, K-3 Filter B-Plant, K-3 Filter Box, Junk Metal, Jumpers, ITS Heaters, Irradiated Steel Spacers, Irradiated Spacers In Burial Box, Irradiated N Reactor Carbon Steel Dummies, Irradiated Fuel Spacers Removed From 105-N #2 Site, Irradiated Fuel Spacers, Irradiated Canisters, Hot Shop Wastes, Hood Panels From L-9, High Level Equipment, High Level B-G Contaminated Failed Equipment From Purex Canyon, HEPA Filters, General Purpose Burial Box, Gantry Crane Steel Beam, Gantry Crane Parts, Fuel Spacers and Canisters Inside Plastic Lined Concrete Box, Fuel Spacers, Fuel Canisters, Filters From 233-S Building, Filters, FB Boxes Waste Rags, Failed Pumps and Agitators, Failed Process Equipment, Failed Motor, Failed Jumpers, Failed Equipment Out Of Canyon, Failed Equipment, F-22-5 Filters, F1 Filter, Expansion Joints, Excess Jumpers, Excavation Material From 2706T W-259 Project, Equipment, Electric Cable Hoist With Trolley, E-E-1 Nozzle Plate, E-E-1 Frame, E-5-2 Concentrator, Drums Of Waste Laundry, Drums Of Waste From 225-B, Drums, Drum Of Filters, Disposal Of Contaminated Change Trailer, Dewatered Sludge, Cut Up Jumpers, Cover Blocks, Contaminated Laundry, Concrete Waste Burial Box, Concrete Styrofoam, Concrete Slab, Concrete Rubble, Concrete Roofing, Concrete Expansion Joints, Concrete Cell Blocks, Concrete Blocks, Concrete, Concentrator Tube Bundles # 53 & 56, Cloth, Centrifuge Blocks From 221-B, Cell Jumpers, Caster Heads, Caster Assembly, Cask With Nozzle Inside, Case Core 15R/C, Carbon Steel, Canyon Waste, Canyon Trash, Canyon Burial From Purex, Canisters Inside Wood Boxes, Canisters, Bulk Soil, Box Filled With Absorbent Layer, Box Containing Straw, Blanks And A Pump, Bent Jumpers, B-2 Tank, Asphalt, Aluminum Shavings, Agitators, Absorbent Material, 55 Gal Drums, 2A Column, 244-AR-Filter Box, 244-AR Vanet Pump, 125 Hp Electric Motor
218-E-12A	Containers, Drums Depleted Uranium And Contaminated Scrap, 241-A Bumper Log, 90 Linear Feet of Hogwire From The B-Plant Intersection Diversion Box, 5/8" Purex Gantry Crane Cable, An Impact Wrench (Redox Type) With The Attached T-Bar Encased In Plastic, Animal Carcasses From 100F, Cardboard Cartons, Containers & Pcs Piping, Containers Air Conditioner Pads, Containers Misc. Waste, Containers Offsite Depleted Uranium, Diversion Box Vent Pipe, Jumper From Purex #6 Trap Pit, Metal, Misc. Boxes, Misc. Shelving, Bins, & Scrap Lumber, Pickup Load of Paper, Poles, Preheat Coil Reading, Routine Trench Accumulation From Purex, Several Truck Loads of Tumbleweeds From 275-EA At Purex's Request, Standard Boxes - Misc. Waste, Temp. Construction Shack, The 102A Pump From 241-A Tank Farm In Special Plastic Shrouded Rack, Boxed Waste From The Purex Plant Containing Both Pu And Mixed Fission Products, Truck Loads of Contaminated Lumber And Trash From 275 EA, Tubes From 241-CR Encased In Plastic And In Burial Boxes, Used Light Bulbs, Waste Cartons of Filter Media From 2E General Area, Wires, Wood, Wood Box Containing Purex Waste From Trap Pit #2
218-E-12B	10 Mil Liner, 303K Building Demolition Rubble - Bulk Waste, 5 Mil Liner, 50 Metal Pallet Bulk Shipment, Absorbed Sludge, Absorbent, Absorbent Pads, Acid, Asbestos, Ashes, Asphalt, Banding, Banding (Steel), Batteries, Blacktop, Bldg A Concrete & Wood, Bldg C & Bldg 'A' Hot Cell, Blocking & Bracing, Blocks Plastic & Wood, Brick, Building A Concrete And Rubble, Building A Rubble Concrete, Building Debris (Asbestos Containing Material), Bulk Asbestos Insulation From 1304N, Bulk Shipment LLSW Insulation From 1304N Emergency Dump Tank, Bulk Waste, Cardboard, Cement, Clay, Cloth, Coal Tar, Coal Tar Creosote, Concrete From A Unit, Concrete, Copper, Cork, Cotton, Cover Blocks, Creosote, D&D Debris From Unit A, D&D of Buildings Parking And Driveway, Dewatered Sludge, Diatomaceous Earth, Dirt, Dried Paint, Driveway, Expansion Joints & Roofing, Feces, Fiberglass, Film Formers (Paints), Filters, Fire Brick, Firebrick, Flange, Flatcar Assembly, Flatcar Wheel Assembly, Floor Sweeps, Floor Tile, Foam, Galvanized, Glass, Glass Small Tools And Parts Incident To The Operation And Maintenance of TFTR Experimental Systems, Gravel, Grout, Grout, Hose, Inert Non-Hazardous Material, Insulation Non-Asbestos, Insulation From 1304N Emergency Dump Tank, Irradiated Non-Regulated Metal (Bulk Waste), Kotex, Lead, Leather, Line Pole 35' Wood, Low-Level Waste, Lucite, Lumber, Metal, Metal Pallets In Bulk Shipment To LLWBG'S, Neutron Activated Construction Debris With Radiological Contamination Below Regulatory Limits, Non-Containerized Tumbleweeds Collected In Compactor Truck, Nylon, Oil, Organic Debris, Oxides, Paints, Panel Covers, Paper, Parks Bldg Rubble, Pedestal Racks, Plaster, Plastic, Plastic Piping, Plexiglas, Plywood , Polyurethane, Porcelain, Powders, Pumps, Pyrofoam, Radioactive Tumbleweeds Collected In A Compactor Truck From Various Tank Farm Location, Resins, Richland Landfill Waste, Rocks, Roofing, Rope, Rubber, Sand, Scabble Debris, Sheet, Sheetrock, Sludges, Soil, Solid Non-Haz Components (Non-Specified), Stainless Steel, Steel, Styrofoam, Tape, Tar, Telephone Pole From Area Next To 2715-Z Pad, Transformer(Iron), Tumbleweeds, Valves, Vegetation, Vermiculite, Void Filler, Waste Dunnage Wood And Pallets, Waste From Membrane Filter Press, Waste Generated By D&D of Building Parking & Driveway, Water, Weeds, Wire, Plastic Packaging, Wood
218-W-1	Misc. Piping From Cell 6C, Sample Can Drying Head No. 1, 2" Powell Globe Valve, 3-5R To 4-8 Gang Valve, Adapter Plug #173, Adapter Plug Wrench Holder, Case Spray Assembly (3 Pcs) From E-2 Centrifuge, Case Spray Line (2 Pieces), Closure Plug #173, Conductivity Cell, Connector Head, Crescent Wrench, Cylindrical Lead Jacket, Dist. Dip Tube, Filter Box W-75399, Filter Cap Holder, Filter Holder For E-3 Vent Line, Gang Valve, 5-6 To 6-1, HF Dip Tube, Micro-Burette, Misco, Ring Balance Recording Meter, Sample Can #173, Sample Can And Adapter Plug #860, Sample Can Carrier Assembly #1000, Sampler, Sampler Assembly, Sampler Assembly From D-4 Tank, Sampler Dip Tube From D-4 Tank, Still Vacuum Receiver, Testing Plug (Old Style), Wexler Temperature Indicator, Adapter Plugs, Sampler Cups (Minus Air Jet), Miscellaneous Cell Connectors, Brackets & Bolts (Part of Sample Cup Holder), Bulk Samples, Chemox Mask, Connector Heads, Crescent Wrenches, Filter Box 231-Z, Filter Cap Supports, Sample Cup Holder Braces (Part of Sample Cup Holders), Sample Cup Holders, Sample Cup Hooks, U-Shaped Sample Cup Guides, Steam Hose, Connectors, Drainage Trays, Stainless Steel, Air Filters, Impact Wrench, Lubrication Connectors, Vacuum Cleaner, Shipping Plugs For Sample Cans, Beckman Tube

Table D-14. 200-SW-2 Operable Unit Landfill Inventories. (5 Pages)

Landfill	Items Known to be Disposed
218-W-1A	Seal Pots, "A" Jumpers From #152 Diversion Box, (E-1) HF Dip Tubes, (E-1) Thermohms And Wells, (E-3) Thermohm And Well, "A" Jet Assemblies, "B" Jet Assemblies, 1/6 Hp Motor, 1" Aloyco 150 Stainless Valve/224-T, 10 GPM Jets/224-T, 291-T No. 2 Fan Assembly Including Steel Inlet And Outlet Duct Work, 3 Gpm Jet/224-T, 30 Ft Pipe, Stainless Steel, 500 Ft Water Hose, A-1 Thermohm, Agitator, AT Tank, B-1 Thermowell, Bed Cover Bows, Bottom Section of Scrubber, Bucket From Cask Assembly 190#, Cabinets, Capsule Section of ORNL Waste Storage Tank Sludge Sampler Capsule Type Plus The Carrier Lift Yoke - In 10" Pipe Container, Centerpole And Superstructure of Clamshell Type ORNL Waste Storage Tank Sludge Sampler In 10" Pipe Container, Centrifuge Concrete Block Section 19-R, Centrifuge, Foundation, Clothes Drying Machine, Commander Air Sampler, Condenser, Stainless Steel, Corrosion Sampler, C-R-2 Tank, D-12 Pot Redox, D-12 Waste Concentrator Pot, D-2 To D-3 Overflow Line, D-3 Thermowell, Damper Section of Outlet Duct Over The Electrically Driven Fan / 231-Z, Dip Tube, Distributor B-1, Double Thermohm And Well For B-1 Tank, Drip Catcher From Recycle Line, Drive Fork From E-4 Centrifuge, Electric Muffle Furnace, F-10 Tank No. 224-140, Fan And Ductwork / 291-T, G.E. Ion Chamber, GE Air Sampler, HF Dip Tubes, Idler Wheel, Inlet & Outlet Ducts To Steam Engine Fan / 291-T, Invasion Pipe, Jet Assembly, Jumper Upper 2 To Lower 13 Having Blank Supporting Connector To Upper 7, Jumpers Redox, Lead Cask For Wafers, Metallurgical Cut-Off Box, Model K Skilblower, Overflow Lines From Tanks, Overflow Pipes (25-12 Fabrication)/224-T, Overflow Pots Det. 63730/224-T, Plow From B-2 Centrifuge, Plow From E Centrifuge, Preheater Coils, Reduction Gear, Repair Scaffold, Rubber Floor Mat, Rubber Tires Form Lorain Crane, Sample Cans (#134, 150, 180, 272, 374), Sampler Dip Tube, Sampler Dip Tube From E-4 Tank, Sampler Jet And Assembly/224-T, Seal Pots & Overflow Lines, Stainless Steel, Sections Sludge Pipe, Selsyn Motor, Shipping Crates Known As "Bird Cages", Side Boards, Silver Reactor And A D-3 Condenser Redox, Skimmer From B-2 Centrifuge, Sludge Box, Sparger D-1, Stainless Steel Drum 15 Gallons, Steam Coils--Air Conditioning Units 221-B, Tank Distributor And Tail Pipe (2 Pieces), Tank Sampler Dip Tube, Tank Thermohn Dip Tube, Tank Wt. Ftr. Dip Tube, Tarpaulin Cover, Thermohm, Thermohm Dip Tube, From D-1 Tank, Thermom Well, Timer – Model Sm 60, Top of Glass Lined Tank, Transfer Box And Cover of Capsule Type ORNL Waste Storage Tank Sludge Sampler In Wood Box, Two Silver Reactors Redox - Box Broke During Burial, Variac From Chemical Assay Board, Vari-Speed Stirrer Motor (Without Stand), Vent Pipe From E-4 Tank, Wt. Ftr. Sp Gr Dip Tube Assembly, Wt. Ftr. Sp Gr Dip Tube From D-1 Tank, H-4 Oxidizer Pot Redox, Misc. Canyon Waste Redox, One ORNL Supernatant Waste Sample (Pump Type), One Transfer Box For ORNL Waste Storage Tank Sludge Sample (Clamshell Type), One Carrier Assembly For ORNL Waste Storage Tank Sludge Sample (Capsule Type)
218-W-2	No data
218-W-2A	Pumps, Process Tube Sections, Lumber, Misc Hardwire, Plywood, Burial Log Reports BNW Waste 10-10-73, Buried Contaminated Railroad Tracks, Cell Equipment, Contaminated Soil, D-12 Concentrator, D-14 Vessel PDR 89-63, H-4 Vessel, L-1 Vessel, Lines And Whaler Box, Misc. Redox Cell Equipment, Old Purex Pump Box, Redox B-12 Tower, Redox B-4 Filter, Redox H-4 Pot, Redox Tube Bundles, Silo Jumpers (Brandy), "D" Cell Sludge, B-Plant Centrifuge Yoke, 1951 International Harvester Dump, 1B-3 Cask Fuel Assembly, 2 B-Plant Filter Assembly, Pumps, 324 Bldg "Hot Cell" - Dry Solid Wastes, A 2 VBH Filter From Redox, A Redox Centrifuge, A Vapor Line From The B-4 Pot, Agitator Motor, Agitators, Agitators And The Tunnel Door, AR Filter, B-3 Dissolver Lower From Purex, Barrels of Waste, Metal Junk Boxes, Box Containing Jumpers, Burial Vault Marked "B-Plant 58526", Canyon Cleanup, Cell 2E Filter B-Plant, Cell Cover Blocks, Chain Fall, Concrete, Concrete "Hot-Waste" Disposal Box Containing Dry-Solid Waste From 324 Bldg Cells, Concrete Plugs From 241-TX Tank Farm, Concrete Posts And Tumbleweed, Container Misc. Scrap From 271-T, Container Silo Jumpers, Contaminated Dirt, Contaminated Dirt From Laundry Berm, Contaminated Load Dirt, Contaminated Railroad Iron, Contaminated Soil, CR Filter, Diatomaceous Earth, Dirt, Dirt Scraped From Top of The Bottom of Old 216-T-4-1 Pond, Dump Truck Loads of Contaminated Soil From 200-W Laundry Ditch, Dump Truck Loads of Contaminated Soil Removal From Laundry Berm-West Area, Galvanized, Gaskets, Glove Boxes, Gondolas Containing Misc. Materials From B-Plant, Gravel From Roof of Building 222S, H-2 Redox Centrifuges, H4 Redox Vessels, Iron, Irradiated Ring From Fuel Case, Jumpers, Laboratory And Building Equipment, Lard Cans, Lids From Diversion Box 241-TX Tank Farm, Metal, Misc. Lab Waste, Misc. Purex Connector Heads, Misc. Waste From Redox Canyon, Miscellaneous Items From Redox, Miscellaneous Items From U-Plant, Obsolete Parts, Pallets, Pipe, Pipe Plugs From 241-SX Tank Farm, Pipes, Pumps, Purex Dissolver Tower Jig, Purex Tube Bundles, Rad. Signs And Chains, Railroad Steel Rails And Short Ties From 241-TX, Railroad Ties, Redox Agitators, Redox D-12 Vessel, Redox Heat Exchanger Tube Bundles, Redox L3 Concentrator Loop Without Tube Bundle, Redox Offgas Heaters Stainless Clad, Redox Process Solution Pump, Redox Pumps Black Iron, Redox Silver Reactors, Redox D-13 Agitator Motor, Scrap Materials, Scrap Steel, Sheet, Sheet, Shim Rod Sections, Small Contaminated Parts, Small Pumps, Soil, Sprockets, Stainless Steel Rods Used For Hanging Fuel Elements In The PRTR And Test Assembly, Steel Posts, Tank Farm Exhaust Filter, Titanium Tube Bundle - Purex H-4 Tube Bundle #58, Tumbleweeds, Tunnel Door, Vent Blower Motor, Waste Mgt Sheeting 25-1 Tank, Waste-Scavenging Equipment, Wood
218-W-3	109SX Pump, Misc. Lumber, 10' Tube, 200' Hose, 3' Pipe, 30 Gal Drum Concrete, 30-Gal Drums, 55-Gal Barrel, 5-Gal Cans, Agitator Motor, Asst. Cylinders, Bales Misc Paper, Barrel Oil, Barrels, Broken Hand Tools, Buckets of Dirt, Cartons, Container Hood Panel, Container Poppy Instr., Containers, Containers Filters, Leached UO3 Powder Bags, Misc Plastic, Misc. Pipe, Misc. Pipe Double Wrapped In Plastic, Misc. Trash, Cones, Containers Paper, Containers Rock And Dirt, Containers Waste Oil, Metal Box From U Plant, Conveyor And Process Hood, Crates, Disposable Supplies, Drums, Drums Depleted "U", Ductwork From 241-WR, Dump Truck Load of Misc. Waste From UO3, Exhauster & Tube Bundle, Failed Dissolver Pot, Motor, Fiber Barrel of Misc Scrap, Filter & Vent Pipe, Filters & Frames, Flat Car Decking, Gravel, Hood, Hood Panel, Iron Tanks, Junk, K-9 Pump, KOH Cans, Loads Junk, Loads of Duct & Scrap Roofing, Loose Metal, Misc Junk, Misc. Lumber, Misc. Pipe, Obsolete Z Plant Conveyor Belt, Obsolete Z Plant Filter Boats, Obsolete Z Plant RC Line Hoods And Associated Process Equipment, Pails, Palletized 30 Gal Drums, Paper, Cardboard, Paper Sacks, Pipe, Plastic Covered Panel, Pumps In Boxes, Recuplex Processing Vessels, Rubber Gloves, Scrap Lead, Scrap Roofing, Shelves, Shipment of California Package Waste, Small Z-Plant Centrifuge, Special Wood Box, Stainless Tanks, Standard Carton, Tumbleweeds, Vehicle/Carryall Id-491, Vent Pipes, Windows, Wood Box And Stainless Steel Cabinet, Wooden Box, Wooden Box Covered, Z Plant Condenser Tanks D24 And D25, Z-Plant Nash Hycor Vacuum Pumps of Cast Iron, Z-Plant RMA Line Fluorinator, Z-Plant Vacuum Receivers
218-W-3A	10 Mil Liner, Greenhouse (Carbon Steel And Plexiglas) And Conweb Pads Triple Wrapped In FMP From N-Basin, Carbon Steel Cask Rotator And Conweb Pads Triple Wrapped In FMP From N-Basin, Stainless Steel Table And Damaged Cotton PPE From N-Basin Wrapped In Flexible Material Packaging, Cyclotron Accelerator Steering "C" Magnet, Self-Contained Equipment, Stainless Steel Test Weight Triple Wrapped In Fmp From N-Basin, Carbon Steel Sample Cabinet And Conweb Pads Triple Wrapped In FMP From N-Basin, Carbon Steel Table And Conweb Pads Wrapped In Flexible Material Packaging, Stainless Steel Table And Conweb Pads Triple Wrapped In Fmp From N-Basin, Carbon Steel Rotator Pad And Conweb Pads Triple Wrapped In FMP From N-Basin, 90 Mil Plastic Drum Liner, Carbon Steel Cask Rotator Base Assembly And Conweb Pads Triple Wrapped In FMP From N-Basin, Absorbed Aqueous Solution, Absorbent, Acid, Aluminum Box, Aluminum Wash Tank And Components Internally Contaminated With Depleted Uranium, Animal Waste, Anti-Corrosive Radpad, Asbestos, Ashes, Boron Balls And Boron Ball Dust, Brass Metal, Bulk Shipment Waste of Sludge, Butyl Hypalon Basin Liner, Cardboard, Catalyst Pack, Cement, Ceramics, Charcoal, Clay, Cloth, Compactor Truck of Tumbleweeds, Compressor Supply Fan #5, Concrete, Contaminated Forklift, Contaminated Tensile Tester, Conweb Pads, Copper Magnet Coil Coated With Cured Epoxy, Copper Metal, Copper Wire, Cork, Courtoy Rotary Pellet Press, Diatomaceous Earth, Diatomite, Dirt, Duct Tape, Equipment, Excavated Pavement And Soil, Feces, Ferrous Metal, Fiberglass, Filters, Flat Cars, Floor Sweeps, Floor Tile, Foam, Glass, Glovebox, Graphite, Gravel, Grout, HEPA Filters, Hittman Liner, Hittman Metal Box, Hot Cell Waste, Insulation, Insulation Non-Asbestos, Ion Exchange Column, Ion Exchange Module, Ion Exchange Resins, Iron, Lab Waste, Lead Brick, Leather, Liquid, Magnets, Material From The D And D of The Imhoff Bldg, Mercury, Metal, Metal Dumpster, Metal I-Beam, Metal Piping, Metal Plate Padded With Cloth And Wrapped With Reinforced Plastic, Non-Hazardous Metals, Oils, Organics, Out of Date Equipment, P.V.C., Pallets, Paper, Pipe, Plaster, Plastic, Plastic Bags, Plastic Pyrofoam Rock, Plastic Wrap, Plastic Wrapped Arc Welder, Plastic Wrapped Concrete, Plastic Wrapped Electric Motor, Plastic Wrapped Railroad Flat Cart, Plastic Wrapped Steam Coil Heater, Plexiglas, Porcelain, Pyrofoam Rock, Rad-Sorb Absorbent, Resins, Rock, Roofing Material, Rubber, Rubber Hose, Salt Bath, Sand, Scrap Yard Cleanup, Sheetrock, Silica Gel, Sludge Waste, Sludges, Soap, Soil Organics, Stainless Steel, Stainless Steel Fuel Baskets, Steel, Steel And Concrete Beam Stop, Steel Blocks, Steel Plate, Steel Shot, Steel Storage Tank, Tank, Tank Farms Generator, Tape, Tar, Teflon, Telephone Poles, TMB V Container, Tower T-K2, Tower T-K3, Transite, Tumbleweeds, Vegetation, Waste From Accelerator Maintenance, Waste From D&D of Glove Box Facility, Waste From Haz. Waste Facility Cleanup, Waste From Plasma Exhaust Process, Waste From Plasma Exhaust Process, Waste From R&D Activities, Waste From Scrap Yard Cleanup, Waste From Valve Changeout, Waste Tank From 200W Area Tank 50% Caustic, Water Treatment Process Waste, Wire, Wood, Wooden Structure Surrounding The Uni-I Caisson, Wrapped Railroad Flat Cart, Wyk Absorbent, Zircoloy

Table D-14. 200-SW-2 Operable Unit Landfill Inventories. (5 Pages)

Landfill	Items Known to be Disposed
218-W-3AE	1 Gal Paint Cans, 10 Mil Drum Liner, 12 Mil Plastic Liner, Steel Heat Exchanger With Asbestos Wrapped In Plastic, 200 ADP B-Plant LLW And HEPA Filters, 250Ml Poly Bottles, 2714U Pad UO3 Drum Overpack, 291T Prefilter # 1, Electric Motor Wrapped In Plastic, Steel Motor With Asbestos Wrapped In Plastic, 300 ADP - 1.25% Enriched Fuel Billet, 300 ADP - Depleted Uranium Dioxide, Soil, Steel Pump Wrapped In Plastic, 324 Airlock Waste, 324 B Cell Grout Container, 324 B-Cell Clean Out - 1B Rack, 324 Facility A-Frame HEPA Filter With Steel Shielding, 324 Facility Non-Compactable Waste, 324 Facility Waste, 324 Legacy Waste - C-Cell Waste, 325 Waste Supercompacted At ATG, 327 Basement Waste (LLW), 327 Facility Compacted Waste, 327 Legacy Waste - IX Resin, 327 PNNL Legacy Waste, 3712 Building - Depleted Uranium Billets (Stuck Mandrels), Wood Box Filled With Wire Rope Chockers Wrapped In Plastic, Steel Plate Wrapped In Plastic, 55 Gallon Crushed Drums, 55 Gallon Metal Drum, Steel Plate Wrapped In Plastic, Lab Aqueous Solution - Solidified, Bag of Trash And Empty Poly Bottles From I&H Lab Filled With Kitty Litter, Empty 15 Gallon Drum Filled With Kitty Litter, 90 Mil Plastic Drum Liner, Absorbent, Absorbent Rad Pad, Absorbed Liquid Waste, Absorbed LLW, Absorbed Non-Haz, Liquid And Small Amount of Non-Haz, Paint, Absorbed Oil, Absorbed Plain Water That Is Radioactively Contaminated, Absorbed Sludge, Absorbed Tritiated Water, Absorbed Tritiated Water In Inner Containers, Absorbent, Acid Brick, Acid Brick And Concrete Mortar, Acid Neutralized, Activated Accelerator Components, Activated Charcoal, Activated Metal, Activated Metal From The High Beam Reactor Canal, Activated Metal In Lead Shielded Cask, Activated Scrap & Equipment, Aerosol Can Empty, Airlock Waste, Aluminum Canisters, Aluminum Canisters & Cubicle Lids, Aluminum Frame, Aluminum Light Assembly, Aluminum Paper, Aluminum Pipes, Analytical Process Waste, Animal Waste, Asbestos, Asbestos Contaminated Equipment And Material Used For Decontamination, Asbestos Contaminated HEPA Filters, Asbestos Floor Tile, Asphalt, ATG Compacted LLR Waste, ATG Compacted LLR Waste From 222S Analytical Ops, Shipment 99-W-091, B-25 Metal Box, Bags, Bags Metal Pipes, Bags Paper, Basement Cleanout Waste, Batco - West Jefferson Compacted Low-Level Debris, Battelle Columbus LLW From Cell Cleanout, B-Cell Bridge Crane, B-Cell Cleanout - Grouted-Hittman Liner, Beam Line Dismantling, Bedding, Biological Material, Bldg 310 Retention Tanks, Blower, Brookhaven Graphite Research Fiberglass Mesh And Associated Framework, Buckets, Buggy Springs, Bulk LLW Waste From BDI Roll-Off Boxes, Bulk LLW Waste From Compactor Truck, Bulk LLW Waste From HO-68H-3500 Compactor Truck, Bulk LLW Waste From Mowatt Construction Dumpster, Bulk Shipment of Waste Byproduct of Iron Co-Precipitation, Bulk Shipment Waste of Sludge, Bulk Waste For Disposal, Bulk Waste Shipment, Burial Box, Butyl Hypalon Basin Liner, Camera, Canister Crusher From N-Basin Wrapped In Plastic, Cans, Canvas, Canvas Gloves, Canyon Deck Cleanout, Carbon And Stainless Steel, Carbon Steel, Cardboard, Cast Iron, Catalyst Pack, Category 1 Noncompactible LLW, Category 3 Noncompactible LLW, Cation Exchange Resin, Cell Equipment And Miscellaneous Solids, Cement, Cement Powder, Cemented Sludge, Ceramic, Cesium IX Columns From D-Cell, Chairs, Charcoal, Cheesecloth, Clamps Fittings, Clay, Cleanout of Contaminated Equipment From C-Farm, Cleanout of Legacy Waste From Pits And Trenches, Closure Head And Related Hardware, Closure Head Shipping Container, Cloth, Cloth, Co-60 Irradiator That Contains Lead Shielding, Coal Tar, Coke Breeze From Anodes, Compactable LLW, Compactable Trash, Compacted 55 Gallon Drums of General Lab Waste, Compacted Cloth, Compacted Empty Tru Drum Pucks, Compacted Gallery Waste, Compacted Laundry By Products From Interstate Nuclear Services, Compacted LLW, Compacted Non-Hazardous Waste, Compacted Paper, Compacted Plastic, Compacted Rubber, Compacted Trash, Concrete, Concrete Vault, Conded Pads, Contact Handled LLW From SFO, Contaminated Dumpster, Contaminated Earth, Contaminated Equipment, Contaminated Ion Exchange Columns And Associated Material, Contaminated Material From The Hot Cell, Contaminated Pre-Filter Form 100K Basins, Contaminated Supplies From 324 Facility, Contaminated Water, Conveyor Belts From KEH Hot Yard, Conwed Pads, Coolant Pump And Motor, Copper, Core Basket Thermal Shield And Related Hardware, Cotton, CP5 Reactor Metal, CP5 Reactor Paper, CP5 Reactor Plastic And Concrete With Steel, CPC Metal Box, Crushed Aluminum Fuel Storage Canisters And Cubicle Lids, Crushed Drums Used To Store And Ship Radioactive Liquid, Crushed Glass, Cured Chico Compound, Cut-Up Cement Mixer, D&D Clean-Up Waste, D-Cell Skids, Debris, Decommissioned Change Trailer, Dewatered Filter Press Sludge, Dirt, Depleted Cf-252 Source, Disposal of Old Equipment, Drained Metal Pumps, Drained Vacuum Pumps, Dried Sludge Cake, Drill Press From N-Basin Wrapped In Plastic, Drop Light, Dry Solid Material Segregated In Oil Solidification Project, Dry Vermiculite, Duct Tape, Ductwork, Dunnage Plate, Eclectic Motor, Electric Wire And Plug, Electrical Wire, Electro-Static-Precipitator, Empty Collection Poly Bottle, Empty Thermocouple Receiver (Steel), Encapsulated Radium Beryllium Source, Enduropak, Equipment, Excavated Soil And Pavement, F-102 Filter Assembly, Fan Wheels From Duct Level, Fiber Glass, Fiberglass, Filter Frames, Filter Wheel From Duct Level, Filters, Fire Retardant Blankets (Fiberglass), Floor Sweeping Compound, Floor Tiles, Fuel Basket, Fuel Spacers, Gantry Crane, Garbage Cans, Garden Hose, Gasket, General Lab Waste, Glass, Glove Box Waste, Glove Port "O" Rings, Glovebox, Glovebox Filters, Gloves, Graphite Blocks, Gravel, Grease, Grit Blast Media, Groundwater Slurry, Grout, Grouted Hittman Liner From B-Cell Cleanout, Grouted Uranium, Grouted Waste, H-3 Contaminated Water, Hard Tool Slurries From Water Table, Heavy Equipment, Hemp Rope, HEPA Filters, HEPA Vacuum Pre-Filters, HEPA Vacuums, Herh Process Tubes, Hittman Cask, Hood Parts Generated From Maintenance Operations, Hood Waste, Hoses, Hot Cell And Gallery Waste At 324 Facility, Hot Cell Compactable Waste, Hot Cell LLW, Hot Cell Metal Hardware, HWMF Yard Waste, Hydraulic Fluid Filters, Hypalon Gloves, Industrial Waste Water Gravity Filter Media, Insulation, Insulation And Absorbed Non-Haz Liquids, Insulation And Rubber, Irradiated Hardware, Irradiated Metal LLW, Kitty Litter, Ladder, Lathe, Lathe From N-Basin Wrapped In Plastic, Laundry By Products From Interstate Nuclear Services, Lead (Used As Shielding), Leather, Legs From Columns, Light Metal, Lime And Animal Feces, Liner, Old Style Cartridge Filters Packaged Inside 2 Inch Metal Liner Om Poly Reinforced Bag With Radsorb, Enduropak (Tritium Absorbed On Charcoal Filter), Machinery Parts, Manipulator Body, Mask Filters, Material From D And D of A Reactor Facility, Material From D And D of The Imhoff Building, Materials Loaded From B-Cell, Metal, Metal Bolts, Metal Cabinet, Metal Carts, Metal Ducting, Metal Ducting Plastic And Rubber Debris, Metal Framed And Wood Framed HEPA Filter, Metal Framed HEPA Filters In 12 Mil Liner, Metal Glovebox, Metal I-Beam, Metal Rail Car Used To Transport Recovered Acid, Metal Scaffolding, Metal Steel Shot, Metal Tools, Metal Valves, Milling Press From N-Basin Wrapped In Plastic, Mirvada Ore (Dirt), Miscellaneous Solids With Tritium (Absorbed), Miscellaneous Solids With Tritium Gas, Molecular Sieve, Mono Tube Pistons, Mop Head, Motor, Mud, N Reactor <1% Enriched Contaminated Finished Fuel, N Springs Bottle Rinse - Solidified, Neoprene Hose, Non-Containerized Tumbleweeds, Non-Reg Oily Rags, Non-Regulated Leaded And Unleaded Hypalon Gloves, Non-Regulated Mask Filters, N-Reactor Carbon Steel Fuel Spacers, Nylon Reinforced Plastic Liner, Nylon Rope, Oil, Oil Mist Bound In HEPA Filter Media, Oil Solidified With Petroset Ii, Oils (Lab Pack Form), Organics Solidified, Paint Chips, Pam Probe, Pans, Paper, Pipettes, Plasma Exhaust Treatment Waste, Plastic, Plastic Fire Blanket, Plastic Glove Rings, Plastic Scraps, Plastic Sheets, Plastic Strike Plates, Plastic Wrap, Plastic Wrapped HEPA Filters And 12 Mil Liner, Plate, Plexiglas, Poly Bag, Portland Cement, Powder Sources, PPE, Precipitate From Neutralization of Acidified Dog Tissue Grouted With Portland Type III Cement, Pre-Filter #2 From 291T Filter Changeout, Pre-Filters & Tent From 242A, Prefilters And Stepoff Pad Waste, Pressure Washers, Pumice, Pump, Pump Capsule & Pump Sleeve, Pyrofoam, Quinto Lubric On Rags And Filters, Rabbit Feces, Rad Gloves, Rad Pad And Pyrofoam Void Space Filler, Rad Rope, Rad Sorb, Rad. Contaminated Material From The Hot Cell, Radiologically Contaminated Equipment Which Has No Further Use, Radium Sources, Radium-Beryllium Neutron Sources Shielded With DU & Polyethylene, Rags, Rail Car Truck (Wheel Assembly), Railroad Ties, RARA Tumbleweed Cleanup, Reactor Closure Head, Reactor Parts From The CP-5 Reactor, Rebar, Rec Airlock Waste, Regulated Low Level HEPA Filters, Remote Filer Media And Metal Framing, Resins, RH Debris Waste From 327 Hot Cells, RH LLW Hot Cell Waste Shielded To CH Levels, Ridge Nuclear Cutting Fluid On Rags, RMW Grease #2, Rock, Rod Sections, Rollers, Rolls of Plastic, Roofing Material, Room 301 Waste Removal, Rope, Rope (Hemp), Rubber, Rubber Bucket, Rubber Hoses, Rubber Matting, Rubber Shoes, Rubber(Electrical Wire), Rubble, Sample Liners, Sampler And Universal Liners, Sand, Saw Blades, Scissors, Scrap, Scrap Metal, Self Contained Equipment, Self-Contained Prefilter From 291T Filter Banks, Sheeting, Sheetrock, Shovel, Shredder, Signs, Sissel Craft Paper, Size Reduced Dunnage, Small Metal Carts, Small Tools, Soil, Solidified Liquids, Source And Source Like Material, Sources In Pigs, Spacer, Spacer Funnel, Sr-90 Stainless Steel Source Tabs, Stainless And Aluminum Canisters, Stainless Pipe, Stainless Steel, Stainless Steel Fuel Basket, Steel, Steel Bearings, Steel Shot, Steel Tools, Step Off Pad Waste, Stir Mechanism, Strippable Coating And Metal Wire, Sump Cooler Squirrel Cage, Supertiger Waste, Suspect Radioactive Pipe With Smaller Pipes Inside, Table, Tank Contacted Waste, Tank Scale, Tank Solids, Tape, TEDF Bulk Shipment of Sludges, Telephone Poles Wrapped In Plastic, Thorium Metal Samples, Tk-131 Pump And Riser Pipes, TMB-V Container, Tool Box, Tools, Transite Ductwork, Treated Grouted Uranium, Tritium Target Canisters, Trolley From 30 Ton Crane System, Truck Assembly From Rail Cars, Tumbleweeds, Unirradiated Aluminum Clad Fuel, Vadose Zone Hard Tool Slurry, Vegetation, Vent Duct, Vermiculite, Waste From Cleanout And Relining of Process Sewer, Waste From D And D of A Reactor Facility, Waste From D And D of Glove Box Facility, Waste From Membrane Filter Press, Waste From O And M of TFTR, Waste From Pad Cleanup, Waste From Water Treatment, Waste Generated From Analytical Operations, Waste From The Supertiger Waste Substream, Waste Water Filter Samples, Water, Water Table Sand And Groundwater, Water Tower Pieces 3902-B Demolition, Water Treatment Process Waste, Welding Rod Wood Towel, WESF Hot Cell Cleanout, West Jefferson Compacted Low Level Waste, Wiring, Wood, Wrap Process Area Room Waste Drum, Paper, Wrap Room Waste Drum Pucks Containing Imbiber Beads

Table D-14. 200-SW-2 Operable Unit Landfill Inventories. (5 Pages)

Landfill	Items Known to be Disposed
218-W-4A	Containers, Ladders, Panel, Vacuum Pump, Wooden Boxes, #8 Filter Box, 002-Ur Agitator Assay From 106-Tx Tank Farm, Refrigerator, Loose Concrete, Blacktop, Roofing Grave, Hot Dirt, Gate, Coil (Helical), Boxes - Contaminated Filters, Wooden Box, 14-Ft Stepladder, 1A Column & Capsule, 2 Sections of Down Comer Pipe, 2 Ton Dump Truck of Scrap Metal From Minor Construction, 22 Pallets Holding 88 Drums, 221-T Dissolver And Tower, 233S Ductwork, 233S Filters, 241 SX Pump, 241-SX Deep Well Pump, Filters, 30 Gal Drum Dirty Beryllium Parts & Scrap, 3P-SXB-5411-218 Broken Column, Cart, 4 Wheel Cart, Box With 108-F Hood, Drums, A DXT Hood From Room 38, A Small Paint Locker From 231Z, A T-Canyon Waste Receptacle, A Weighing Hood From Room 179-B, Agitator, Agitator Box, Agitator Parts, Air Duct From 100F, Air Ducts, Airsamplers, An Iron Box From U Plant Containing A Purex Tube Bundle And Misc. Other Debris, Ballast Pump, Barrel, Barrels From Coors, Batteries From Garage, Beam Off Roof, Belt Sander Buehler, Boeing Missile Waste, Box, Boxes From 234-5 Bldg Task 1 RMA, Broken Hand Tools, Buried 3 Stage Pumps, Buried 3-R Dissolver & Tower From 221-T Bldg, Cans, Cat, Centrifuge And Tank From U Canyon, Centrifuge Block, C-Line Hood 39, Coil, Coils From The #5 Boiler Room At Redox, Column, Column Jumpers, Concrete, Concrete Block Classified Debris Samples, Container of Pipe, Container Paper, Containers Natural Uranium, Containers of Pipe, Containers of Silo Waste, Containers of Std Cartons & Buckets, Containers P.R. Can, Containers Special Burial P&Co Unloaded Box, Containers Waste Oil, Contaminated Parts, Cover Block, Crate, Cribbing, Cylinders Containing Unclassified Material, D-1 Dissolver From Recuplex, Deep Well Pump TX-115, Desks, Diffuser Pump, Dirt, Disposable Supplies, Dog Cage, Door, Down Comer Pipe Cones From Heaters, Drum, Drums Beryllium, Dry Blender Mixer, Dry Waste, Duct Boxes, Ducts, Dumped 221-T Canyon Waste, Failed Agitator Assembly With Motor, Fiber Barrels, Filters, Fire Brick Out of Incinerator, Food Mixer Hobart, Four Hoods From 222-U, Fuel PRTR Element, Furnace, Glass, Glove Boxes, Gondola From T Plant, Gratings, Green Hut Junk, HEPA Filter, Hood #16, Hood 6-A, Hood From The 234-5 Analytical Lab, Hood Panels, Hoods From 234-5 For Finished Products, Iron Lung From 233, Iron Plate, K-9 Vessel, Knockout Pots, L-16 Agitator 233S Bldg., Lab Capsule, Lard Cans, Large Box, Large Hood Type Container, Laundry Boxes, Lead Shield, Light Bulbs, Load Asphalt From Roof, Loads Stones, Loose Automotive Parts, Machine Parts, Metal Container of Classified Scrap, Metal Turnings, Minor Const. Burials, Misc Junk From T Plant Around Stack, Misc. Canyon Scrap, Misc. Waste From Redox Canyon, Wood Cabinets, Missile Parts From Boeing, Oil Drum, Oil Drums From 231-Z, Ore, Duck Dunk Truck, Package Ductwork, Pane, Pc Plywood, Pieces Dockwork, Pieces of Lumber, Pieces of Pipe, Plastic Greenhouse & Piping, Plow And Car Chassis, Pr Can, Propane Bottles, PRTR Shim Rods In Cap, Pump Motor, Pump Wrapped In Plastic, Pump X19 From 224-U, Pu-Oven, Purex 1-D Column Capsule, Purex Wall Racks, Radiator, Rags, Rc Can, Recuplex Waste, Recycle Hood And Piping Reading, Redox Column Carrier, Redox Column Carrier Chain, Redox Dissolver Filters A4 & C4, Redox F-1 Pot, Redox Silo Equipment, Room Fan, Rubber Gloves, S Farm Steam Line Lagging Tx, Salt Pot, Sand, Scaffolding, Scrap From 291 Z, Scrubbers, Several Dry Filters From 234-5, Sieve Testing Shaker, Electric Motors From 224-U, Slab Cover, Smokestack, Spray Ring, Stainless Steel Polishing Hoods From 234-5, Standard Cartons, Steam Radiators, Stove Port 234-5, SX-118 Pump, T Plant Junk Box, Tank #8 221-U Bldg, Ties, Tile, Tile Field From 234-5, Tires, Tower, Trailer Planking, Tubing And Tin Boxes, Tumbler, Valves, Vent Tubes, Weeds, Windows, Wood Crate, Wood Crated Process Hood, Wooden Box, Wooden Boxes Containing Bamboo Scrap, Wooden Crates From 233S
218-W-4B	17' Boat & 60 Hp Outboard Motor, 165 Lb. Furnace, 2" Hand Rail, 55-Gallon Drums Encased In Concrete, 9B Filter Head Assembly, Absolute Filters, Beryllium Contaminated Waste, Blocks, Box, Burial Box, C.W.S. Filters, Cables, Canyon Waste Boxes, Carbon Steel Tank, Cartons, Cell Waste, Centrifuge, Chem Pumps, Concrete, Conduit, Construction Scaffolding, Crushers, D-6 Agitator Motor Assembly, Dead Animals, Drive Heads, Drum Dot 6M, Drums of Sand, Dry Boxes, Dry Filters - 55 Gal Drums, Duct Units, Ductwork, Evaporator Pot, Exhaust Line, Failed Crane Wheels, Filter Box, Filters, Fittings, Flange, Fume Hood Filters, Furnaces, Gear Reducer, Glove Boxes, Grinder Machine & Hood, Hardware Steel, HEPA Filter, Hood, Hoods, Hot Dirt In Rags, Hot Sand, Hydrostatic Pump, Ice Chest, Inlet/Outlet Exhaust Dampers, Kinney KC-3 Vacuum Pump, Lab Misc. Waste, Lab Paper Waste, Lab Stool, Ladders, Lumber, Manipulator Boots, Metal Boxes, Metal Canyon Waste Boxes, Metal Dry Filters, Milling Machine And Hood, Misc. Laundry, Misc. Scrap, Non-Combustible Waste, Oily Rags, Pallets of Lead Brick, Paper, Piping, Plastic, Plate, Plywood, Plywood Boxes, Process Filter, Process Waste, Pumps, Radiation Boxes, Rats, Rubber Gloves, Safeway Scaffold, Saw Fines, Scaffold Board, Scrap From Vipac, Shelving, Steel Boxes, Steel Decking, Steel Table, Transite Pipe, Two Boxes From 292-T, Vacuum Gage, Vacuum Pumps, Valves, Vinyl Bags, Wood, Wood Box With Lab Equipment, Wood Decking From Railroad Flatcar, Zak Machine, Absorbent, Animal Waste, Cardboard, Ceramics, Cloth, Concrete, Cotton, Diatomaceous Earth, Dirt, Filters, Galvanized, Glass, Graphite, Insulation Non-Asbestos, Iron, Kitty Litter, Kotex, Lumber, Metal, Nylon, Oils, Paper, Plastic, Polyurethane, Rags, Resins, Rubber, Sheet, Stainless Steel, Vermiculite, Wood
218-W-4C	10 MIL Plastic Drum Liner, 100N Compacted Waste, 100N Compactor Drums, 26" Vac. Job, 30 Ton Cask, 327 Facility Compacted Waste, 55 Gallon Waste Drums, 8 Mil Liner, 90 MIL Plastic Drum Liner, Absorbed Aqueous Solution, Absorbed Liquid Waste, Absorbed Urine, Absorbent, Acid, Activated Accelerator Components, Activated Stainless Steel From FFTF Reactor, Aluminum Tubing, Animal Feces, Animal Tissue, Animal Waste, Anti-Corrosive Radpad, Asbestos, Asbestos Contaminated Equipment And Material Used For Decontamination, Ashes, Asphalt, Batco Pool Filters And Resins, Biological Material, Blacktop, Blood, Bolts, Boron Carbide Balls, Brass Metal, Brick, Bulked Waste, Carbon Steel, Carbon Steel Shot, Cardboard, Cask Coolant Pump, Cathode Tubes, Cell Equipment, Cement, Cemented Sludge, Ceramics, Charcoal, Chemical Stripper, Clay, Cleanout of Legacy Waste From Pits And Trenches, Cloth, Cloth Rags, Commercial Lab Sample Return, Compacted Empty Bottles, Compacted Gallery Waste, Compacted Lab Waste, Compacted LLR, Compacted LLSW, Compacted Paper, Compacted Plastic, Compacted RCRA-Empty Bottles, Compactable Waste, Compactor Drum, Concrete, Conweb Pads, Coolant Pump, Copper Metal, Copper Wire, Cork, Cotton, Crushed Glass, Debris Waste, Decon Tank, Depressurized Fire Extinguishers (Full), Desiccant, Dewatered Sludge, Diatomaceous Earth, Dirt, Drierite, Dry Vermiculite, Duct Tape, EAL Lab Labpack, Epoxy, Equipment, Excavation For 2706T Construction Project, Excess Non Regulated Chemicals From Building Clean Out, Feces, Ferrous Metal, Fiberglass, Fiberglass Floor Filters, Fiberglass Floor Tiles, Fiberglass Prefilters, Filler, Filters, Firebrick, Fissile Waste Drum, Flanges, Floor Sweeps, Flume Hood Pre Filters, Foam, Foil, Fuel, Galvanized, General Lab Waste, Glass, Glassware, Glovebox, Gloves, Graphite, Gravel, Grease, Grout, HEPA Filters, HIC, I-Beams, Insulation Non-Asbestos, Ion Exchange Column, Iron, Kitty Litter, Kotex, Lead, Leather, Light Bulbs, Lime, LLR From Duct Level, LLR Generated From Analytical Operations, LLR Soil From Room 1A Upgrade, LLW Cat 1 Used GAC And Powersorb, Lumber, Metal, Metal Bolts, Metal Cask, Mineral, Mineral Oil In Kl, Non-Hazardous Metals, Non-Hazardous Paint Waste, Non-Infectious Biological Material, Non-Reg Paint Related Waste, Non-Reg. Oily Rags, Nylon, Oilbase, Oils, Oily Rags, Organics (Nonhazardous), Oxides, Paint Chips, Paints, Paper, Paraffin Wax, Parks Township Soil, Pigmats, Pins Or Rods, Plaster, Plastic, Plastic Liners From 200-BP-5 Pump And Treat, Plexiglas, Plywood, Polyacrylate, Polypropylene, Polyurethane, Powders, PPE, Pumice Rock, Pyrofoam, Pyrofoam Rock, Pyrofoam Void Space Filler, Rad Pad, Rags, Railroad Ties, Resins, RMW "Oil-Related Waste", Rocks, Roofing Material, Rope, Rubber, Rubber Gloves, Rust Sweepings, Salt Bath, Sand, Sheet, Sheetrock, Silica Gel, Slaked Lime, Sludges, Soap, Soils, Solidified Sludge From Heel of 200-BP-5 Pump And Treat Tanks, Solvents, Special Fab Type A Container, Sponge, Stainless Steel, Steel, Steel Piping, Steel Shot, Styrofoam, Super 80 Rubber, Talc, Tape, Tar, Teflon, Thinners, Treated Acidic Solids, TRU Room Waste, Tubing, Tuf-Glide, Tumbleweeds, Twigs, Universal Polypropylenes, Used Hurrisafe On Towels, Valves, Vegetation, Vermiculite, Void Filler, Waste From B Cell Cleanout, Waste From D And D of The Ga Hot Cell, Waste From Membrane Filter Press, Waste From O And M of TFTR Experimental Systems, Waste From R And D Activities, Waste From The Nat, Tritium Labeling Facility, Water, Water Treatment Process Waste, Wax, Weeds, Wire, Wood, Wyk (Silica Absorbent), Zircoloy

Table D-14. 200-SW-2 Operable Unit Landfill Inventories. (5 Pages)

Landfill	Items Known to be Disposed
218-W-5	Stainless Steel Canisters, Stainless Steel Canisters, "Exit" Signs With H-3, 1" Pipe, 10 Mil Liner, 152-ER Contamination, Light Pole, 1-Inch Bolts, 219-S Cell Cover Block, 221T Canyon Deck Cleanoff, 241BY Farm Cleanup, 241-TX Misc LLW, 242B Swamp Cooler Removed And Packaged Intact, 250 Ml Poly Bottles, 2706T & Headend Greenhouses, 2706T Cleanup And Step-Off Pad Waste, 2706T Decon And Housekeeping Activities, 3' Bottle Cart, 30' 1.5 ID Abs Pipe, 4" Pipe, 5 Gal. Paint Cans, 60 Horse Power Elect Motor, 85 Gal. Empty Puck Drum, 90 Mil Liner, A Cell Equipment, Abandoned Exhauster Frame, Abs (Pvc) Piping, Absorbent, Absorbed Liquid, Absorbed Oil, Absorbed Propylene Glycol, Absorbed Rad. Contaminated Water And Resin, Absorbed Rainwater, Absorbed Tritiated Water, Absorbed Water, Accelerator Waste, Acetylene Bottles, Acid Brick And Concrete Mortar, Acid Spill Pillows, Activated Accelerator Components, Activated Unused Spare Pump, Adsorbed Plasma Gas, Aerosol Cans, Agar, Air Filters, Air Sampling Equipment, Airline Hose, Airlock Waste, Alara Strip Paint, Aluminum Alloy Casting, Aluminum Channel, Aluminum Conduit, Aluminum Foil, Aluminum Ladder, Aluminum Tape, Angle Iron, Angled Steel, Animal Tissue, Animal Waste, Anion Resin, Annulus Pump Assembly, Asbestos, Ash, Asphalt, Automatic Transmission Fluid, B-12 Box, B-25 Box, B-25 Metal Box, B-26 Box, B87 Metal Box, Bag Floor Dry, Bag Floor Sweep, Bag Laundry, Bag Metal Clamps And Tube, Bag Rubber Boots, Bags Mineral Wool, Bags of Tape, Bags Rock, Barbed Wire, Barrel Rotator, Barrier Cream, Base cabinets, Basin Blow Sand Clean Up, Billet Boxes, Binders, Bio Rad Exchange Resin, Biological Waste, Bird Bones, Bird Carcasses, Bird Debris, Bird Droppings, Bird Nests, Black Beauty Abrasive, Black Mita Toner Cartridge, Bolts, Bone Char, Books, Boral Sheet, Boron Ball Dust, Boron Balls, Boron Carbide Balls, Boxes, Diamond Plate, Braided Steel Cable, Brass Chem-Pump, Brass Piping, Bricks, Broom End, Brooms, Brushes, Bucket, Cabinet, Cable, Phone, Canisters, Cans, Canvas, Canvas Gloves, Canvas Tarp, Canyon Cleanout Waste, Cardboard, Carbon Boiling Chips, Carbon Pieces, Carbon Rods, Carbon Steel Cable Trays, Carbon Steel Pipes, Carbon Steel Shot, Carbon Steel Shot From Scabble Machine, Carbon Steel Shot In Plastic Pail, Carbon Steel Valves, Carbon Steel Ventilation Piping Filled With Pyrofoam, Cardboard, Carpet, Cart, Cast Iron, Cast Iron Pipe, Catalyst Pack, Cathode Tubes, Cattails, Ceiling Grid, Ceiling Tile, Cement, Cemented Sludge, Ceramic Blocks, Ceramic Drywall, Ceramic Insulation, Ceramic Pipes, Ceramic Plates, Cernex, Chain Hoist, Chairs, Charcoal, Chips, Chukar Droppings, Circuit Boxes, Clay, Clay Pipe, Clips, Cloth, Cloth Rags, CLSR Chemical Labpack, Compacted 55 Gal. Drums, Compacted Air Cooled Chiller, Compacted Gallery Waste, Compacted Tumbleweeds, Compaction Disks, Compactor Motor, Compressed Air Bottle(De-Energized), Computer Mouse, Concrete, Concrete Blocks, Conduit Pipe, Construction Debris, Containment Tent, Contaminated Equipment, Contaminated Rad HEPA Filters, Contaminated Refrigerator, Contaminated Ductwork, Contaminated Soil, Contaminated Tools, Contaminated Wood, Conwed Pads, Cooling Tubing, Copper From An Annulus Fan Motor, Copper Piping, Copper Rods, Copper Wiring, Cork, Corkboard, Cosmolubric Hydraulic Oil, Cotton, Cotton Filter, Cotton Insulation, Cotton Liners, Crane Cable, Crushed Spray Cans(Aluminum), Crushed Stainless Steel Canisters From N-Basin, Crushed Vessel (Injection Tank), Crushed Vials, Crylic Latex, Cured Epoxy, Cured Non-Haz Polyurethane Caulking, Custom Container Containing Molecular Sieve, Cut End Fuel Rods, D&D Cyclotron Waste, D&D From Janus Reactor, D-5 Pit Waste, Debris, Decon of Core Sample Truck, Depleted Uranium Turnings & Grout, Depressurized Gas Cylinders, Dewatered Sludge, Diatomaceous Earth, Diesel Motor, Diode Detector, Disassembled 105A Exhauster, Discarded Tools, Disk Drive, Dog Pen D&D, Doors, Drain Pipe, Drain Traps, Drum Rings, Dry Combustibles, Dry Silicone, Dry Sweep, Dry Transformers, Dry Vegetation, Drywall, Duct Tape, Ducting, Dust Pans, Duststop Filters, Electric Cord, Electric Hacksaw, Electric Motors, Electric Submersible Pumps, Electrical Box, Electrical Guide Wire Spool, Electrical Switches, Electroplated Steel, Electropolisher Unit From 324 A-Cell, Empty Punctured Aerosol Cans, Empty Sand Bags From Sand Blast Operation, Empty Shipping Cask, Euroclean HEPA Vacs, Alpha Detectors, Extension Cord, Face Shields, Fan Housing, Feces, Felt, Fiberglass Carts, Fiberglass Insulation, Filler Rock, Filter Media, Fire Hose, Fission Chambers, Flanges, Flex Hose, Floor Tile With Asbestos, Flyash, Foam, Fuel Baskets Wrapped In Plastic, Fuel Rod Spacer, Funnel Covers, Furnace Brick, Furnace Filter, Furnace Slag, GAC Drums, Gas Analyzer, Gate Valve, Generators, Glass Bottles, Glass Insulation, Glass Test Tubes, Glass Wool, Gloves, Gorilla Pipe, Green Metal Fuel Monitor From 100N Basin, Green Tape, Grifflon Fire Retardant Plastic, H-3 Contaminated Water And Resin, Hand Tools, Hazardous Ion Exchange Resins, Headache Ball, Heater, Hemp Rope, HEPA Box, HEPA Filter, Herculite, Hittman Liner, Hoist, Hood Gloves With Plastic Ring And Rubber O-Ring, Hoses, HVAC Filters, Hydraulic Cylinder, Hydraulic Lift Table, Hydraulic Oil, Ion Exchange Column, Ion Exchange Resin, Irreparable Garments, Jascpo Pump, Kitty Litter, Ladder, Latex Gloves, Laundry, Laundry By-Product, Lava Rock, Leachate From Collection Tank At 218W5, Leather, Lids, Life Preserver, Lint, Magnet, Mask Canisters, Mask Cartridge, Mask Cartridge Filters, Mass Spectrometer, Metal Bars, Metal Boxes, Metal Clam Bucket From KEH Hot Yard, Metal Equipment Known As "Blue Goose" From 325, Metal Garbage Can, Metal Lathe, Metal Mounting Bracket, Metal Nuts, Metal Pump From Empty Purgewater Truck, Metal Sprayer, Mops, Motors, Mouse Feces, Mylar Paper, Nails, Neutron Activated Construction Debris, Nickel Chromium Wire, Noncontainerized Tumbleweeds, Non-Friable Asbestos, Nonregulated Oil, Nuts, Nylon Ropes, Oscilloscope Camera, Paint Cans, Palmolive, Paper, Paper Cups, Paper Towels, Petrie Dishes, Piece of Rail Car Platform Shipped As Self Contained Item, Pigeon Nests, Pigmats, Plasma Exhaust Treatment Waste, Plastic Brushes, Plastic Hard Hat, Plastic Port Ring, Porcelain Sinks, Portable Heater, Portable Light, PPE, PR Rubber Gloves, Propane Tank, Pucks With 90-Mil Liners, Pumice Rock, Pump, Pump Motors, Pump Valve, Purex Inlet Filters, Purex Supply Filters Waste, Purex Tower # T-C3-1, Purex Tower T-G2, Purex Tower T-J4, Purex Tower T-L2, PVC Insulation, PVC Piping, Pyrofoam, Rabbit Droppings, Rad Crushed Glass, Rad Sings, Rad Sorb Pads, Radiation Barrier Rope, Radiation Monitors, Radiators, Radiologically Contaminated Equipment That Has No Further Use, Radios, Rags, Railroad Ties, Rain Gear, RCRA Empty Crushed Aerosol Cans & Debris, Rear Truck Assemblies From LLW Rail Flat Car, Rebar, Resin De-Watering Operation Waste, Respirator Cartridges, Respirator Filters, Returned Laundry, Roll of Foam, Rope (Hemp), Rope (Nylon), RR Wheels, Rubber, Rubber "O" Ring, Safety Helmets, Safeway Ladder, Sagebrush, Saw Blade, Sawdust, Scaffolding, Scrap Light Fixtures From Duct Level, Screws, Sea-Land Container, Shear Blocks, Sheet Metal, Shield Plugs, Shoring Materials, Silica Gel From Glove Box Ambient Air Exhaust Scrubber, Silica Gel From Vacuum Pump, Slurries, Smoke Detectors, Snow Roof From U-Cell Cover Blocks, Soft Trash, Solidified Animal Feces And Urine, Sound Proof Doors, Steel Balls, Steel Bellows Transformer, Steel Cable, Steel Elevator Shaft, Submersible Pump, Sump Pumps, Supertiger Waste, Surgeons Gloves, Swamp Cooler, Synthetic Polymeric Material, Tape, Tar Paper, Temp Gage, Teri Wipes, Texwipe Cloths, Thermocouples, Tools, Transformers, Transite Panel With Asbestos, Trash, Tumbleweeds, Tygon Hose, Unistrut, Vacuum Parts, Vacuum Vessel, Vacuums, Verification Tape, Vermiculite, Vinyl Flooring Contains Asbestos, Waste Byproduct of Iron Co-Precipitation, Waste From Animal Research, Water Fountain, Water Sampler, Water Tower 3902-A Demolition, Welding Hoses, Welding Machines, Welding Slag Is of Steel, Wood, Wood Blocks, Wood Carts, Zone 3 HEPA Filters, Zonolite Absorbent
218-W-11	No data

Table D-15. Select Radionuclide Inventory for the 200-SW-2 Operable Unit Landfills (Curies).

Landfill	C-14	Co-60	Cs-137	H-3	I-129	Sr-90	Tc-99
218-C-9	0	0	5.03931	0	0	0.89909	0
218-E-1	0	0	0	0	0	0	0
218-E-2	0	0	0	0	0	0	0
218-E-2A	0	0	0	0	0	0	0
218-E-4	0	0	0	0	0	0	0
218-E-5	0	0	0	0	0	0	0
218-E-5A	0	0	0	0	0	0	0
218-E-8	0	0	0	0	0	0	0
218-E-9	0	0	0	0	0	0	0
218-E-10	0	1900	949237.2	8E-08	0	782838.1	0.004498
218-E-12A	0	0	0	0	0	0	0
218-E-12B	5.59E-12	48001.98	26775.87	0.000199	0	25630.13	0
218-W-1	0	0	0	0	0	0	0
218-W-1A	0	0	0	0	0	0	0
218-W-2	0	0	0	0	0	0	0
218-W-2A	0	3.4	11	0	0	6.2	0
218-W-3	0	0	0	0	0	0	0
218-W-3A	0.139011	47903.9	283259.9	430481.3	0.014386	63955.04	0.285383
218-W-3AE	14.21024	102669.7	83083.31	66818.9	0.000427	61613.57	34.15656
218-W-4A	0	0	0	0	0	0	0
218-W-4B	0	18936.85	322.887	231128.1	0.501	157.612	0
218-W-4C	2.61351	672420.7	2987.699	18971.45	0.00143	4190.551	16.3985
218-W-5	5.445151	4270.958	2850.087	37945.17	3.005093	84746.33	7.235188
218-W-11	0	0	0	0	0	0	0

APPENDIX E

INITIAL CONCEPTUAL SITE MODELS FOR THE 200-SW-2 OPERABLE UNIT LANDFILLS

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FIGURES

TABLE

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APPENDIX E

INITIAL CONCEPTUAL SITE MODELS FOR THE 200-SW-2 OPERABLE UNIT LANDFILLS

This appendix presents the initial conceptual site models (CSM) for the 200-SW-2 Operable Unit (OU) landfills.

Information pertaining to contaminant sources, release mechanisms, transport media, exposure route, and receptors has been incorporated into the CSMs. The conceptual exposure pathway model (Figure E-1) is included to develop an understanding of potential risks and exposure pathways associated with the waste sites. This information forms the basis for an evaluation of potential human health and environmental risk.

Figures E-2 through E-7 present an overview of the CSM for each of the six bins in the 200-SW-2 OU. These CSMs provide a brief description of each bin, including those landfills that are part of the bin. Also included in these figures are photos showing typical sites within the bin, as well as maps showing the locations of the sites.

Figures E-8 through E-33 present the individual site CSMs for each of the 24 landfills in the 200-SW-2 OU. Also included is a CSM for the caissons and vertical pipe units (VPU) in the 218-W-4A and 218-W-4B Landfills. Information included in these CSMs includes historical information, preliminary contaminant distribution models, a summary of past characterization activities, and aerial photos and individual site figures.

Subsequent to publication of DOE/RL-2004-60, *200-SW-1 Nonradioactive Landfills and Dumps Group Operable Unit and 200-SW-2 Radioactive Landfills and Dumps Group Operable Unit Remedial Investigation/Feasibility Study Work Plan*, Draft A, a number of smaller waste sites that once resided in the 200-SW-2 OU were moved to the 200-MG-1 OU in accordance with *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) change requests. This migration of waste sites primarily affected Bin 1 and Bin 2, as described in the Draft A RI/FS work plan. Based on a reassessment of the 24 landfills that now remain in the 200-SW-2 OU, a new set of groupings or "bins" has been established for this version of the work plan. This new set of bins was established based on factors such as waste volume, waste type, waste form, disposal practices, periods of landfill operations, homogeneity of waste, and potential risk, among others. The new bins have been named as follows and are identified as such throughout this document:

- *Bin 1 – TSD Unit Landfills*
- *Bin 2 – Industrial Landfills*
- *Bin 3 – Dry Waste Alpha Landfills*
- *Bin 4 – Dry Waste Landfills*
- *Bin 5 – Construction Landfills*
- *Bin 6 – Caissons.*

Table E-1. Summary of 200-SW-2 Operable Unit Bins.

Bin	Number of Landfills or Caissons in Bin	Landfill Name	General Features
Bin 1 – TSD Unit Landfills	7	218-E-10 218-E-12B 218-W-3A 218-W-3AE 218-W-4B 218-W-4C 218-W-5	Included in DOE/RL-88-20, *Hanford Facility Dangerous Waste Permit Application, Low-Level Burial Grounds* Contain retrievably-stored TRU waste (M-091 Project) Potential for small volumes of sorbed, containerized liquids Potential for areas of subsidence High dose rates
Bin 2 – Industrial Landfills	8	218-E-2 218-E-2A 218-E-5 218-E-5A 218-E-9 218-W-1A 218-W-2A 218-W-11	Potential for subsidence High internal void volume Disposal of failed/obsolete equipment High dose rates Waste typically contained in large wooden or concrete boxes
Bin 3 – Dry Waste Alpha Landfills	4	218-W-1 218-W-2 218-W-3 218-W-4A	Contain ~ 90% of the pre-1970 alpha contaminated low-level waste Waste primarily packaged in fiberboard cartons/boxes/ drums Low potential for subsidence
Bin 4 – Dry Waste Landfills	2	218-E-1 218-E-12A	Waste primarily packaged in fiberboard cartons/boxes/ drums Medium dose rate (up to 2,000 mR/h) Low potential for subsidence Primarily beta-gamma contaminated waste Surface stabilized with fly ash
Bin 5 – Construction Landfills	3	218-C-9 218-E-4 218-E-8	Low activity waste (<100 mR/h) Primarily construction/demolition debris and concrete rubble Low potential for areas of subsidence
Bin 6 – Caissons	~19	218-W-4A 218-W-4B	Some high-dose-rate waste Some remote-handled waste Small containers, such as 3.8 to 18.9 L (1- to 5-gal) cans Some high beta-gamma radiation Potential for small volumes of sorbed organics (lab packs) Eight caissons/vertical pipe units in 218-W-4A Landfill (four potentially unused) Five alpha caissons (M-091 Program; out-of-scope for 200-SW-2 Operable Unit; one potentially unused) Six dry waste caissons in 218-W-4B Landfill

DOE/RL-88-20, 1997, *Hanford Facility Dangerous Waste Permit Application, Low-Level Burial Grounds*, Rev. 1, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

TSD = treatment, storage, and/or disposal (unit).

TRU = Radioactive waste as defined in DOE G 435.1 1, *Implementation Guide for Use with DOE M 435.1-1*.

1

Figure E-1. Conceptual Exposure Pathway Model for the 200-SW-2 Operable Unit Landfills.

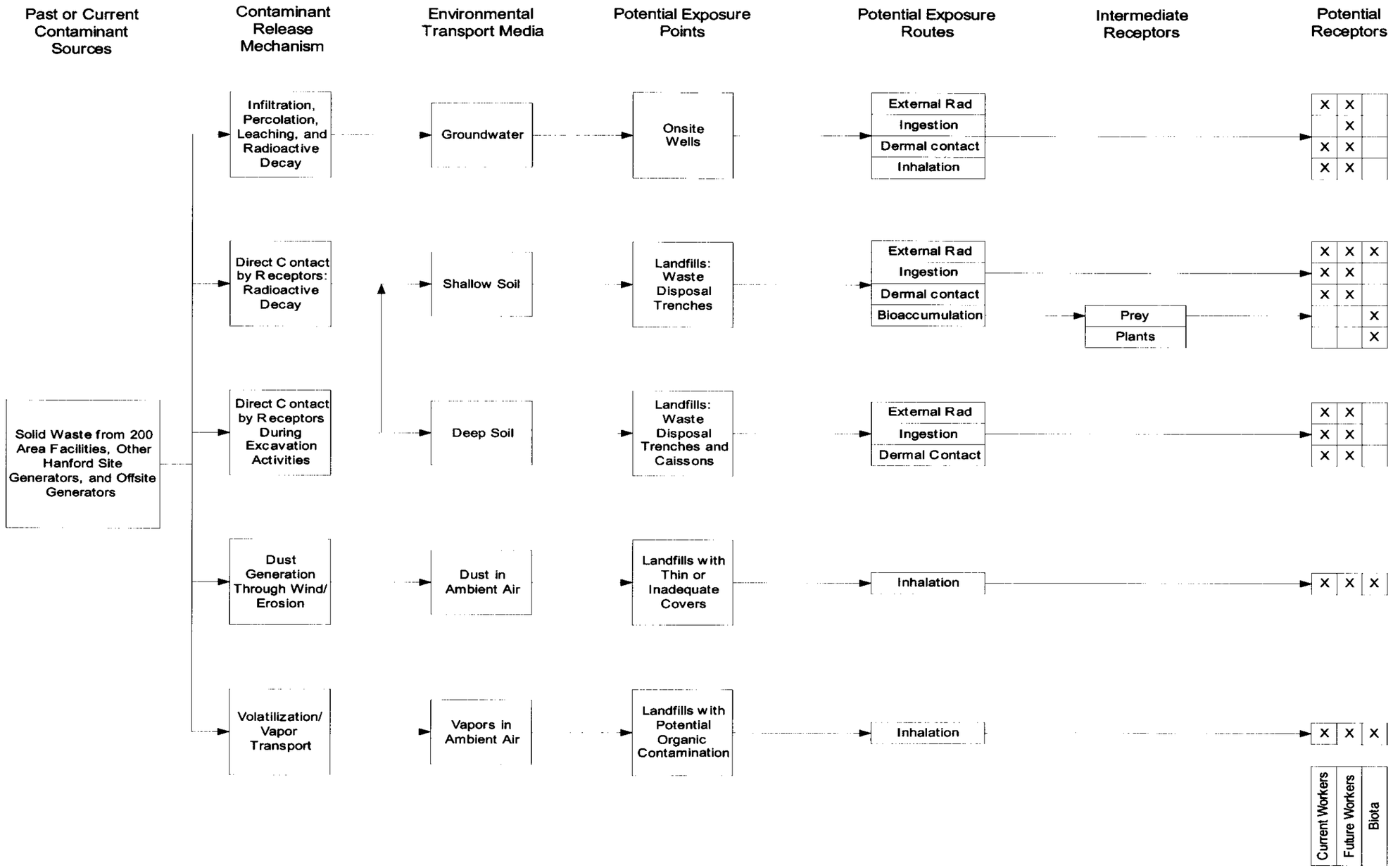
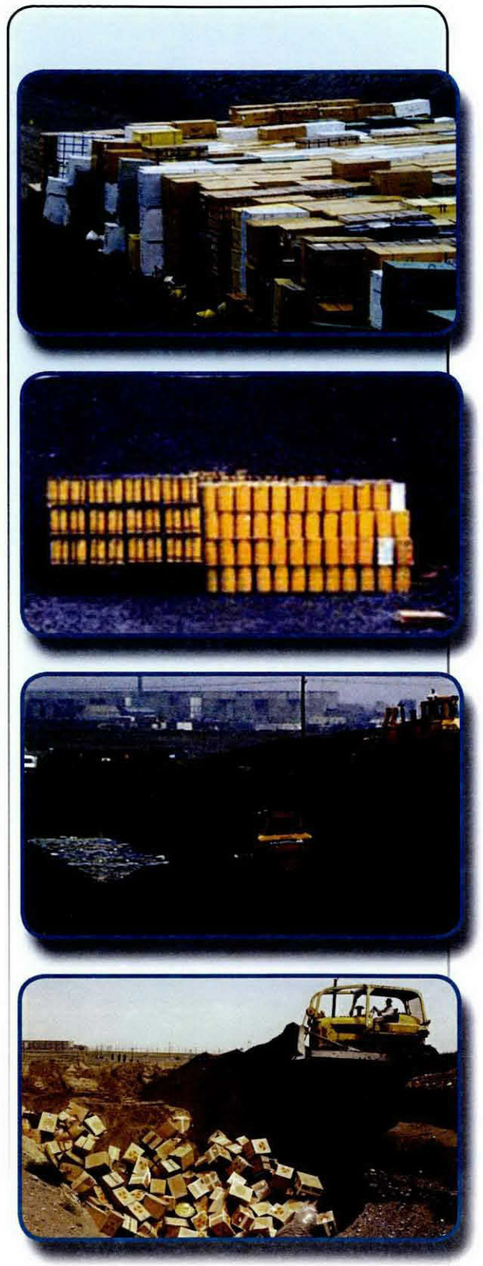
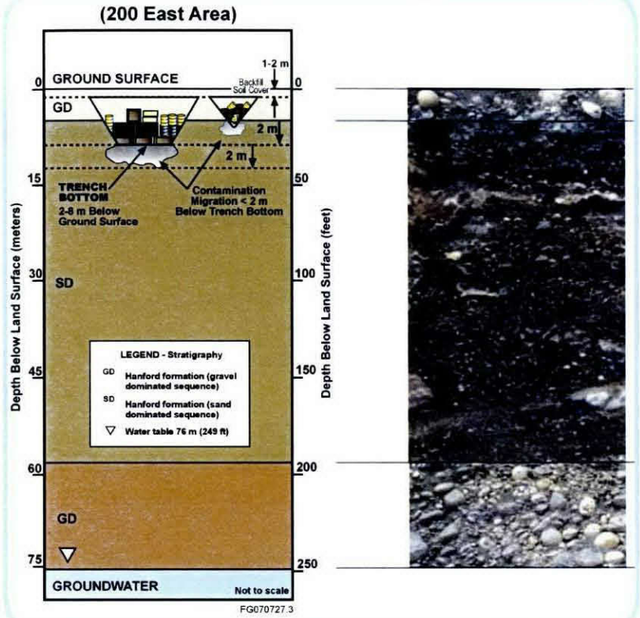
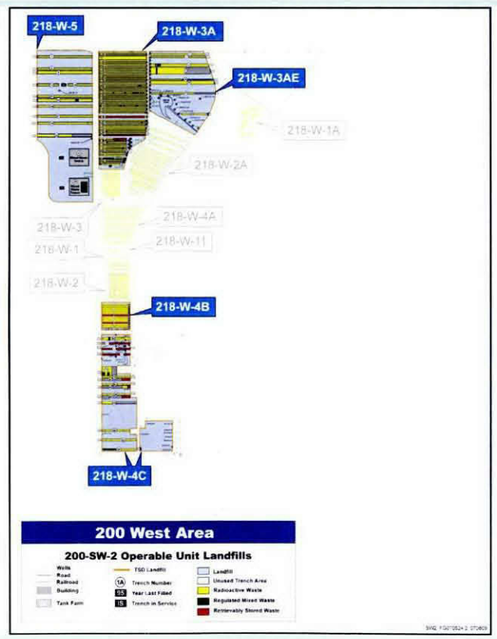


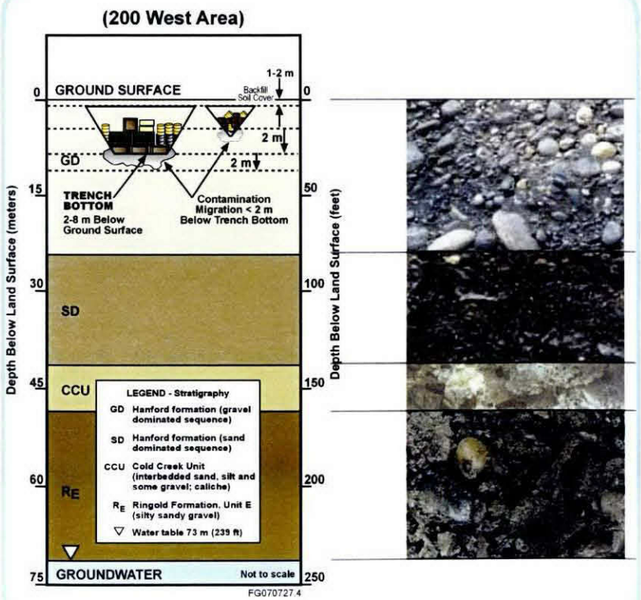
Figure E-2. Initial CSM for BIN 1 TSD Unit Landfills.

Bin 1
TSD Unit Landfills





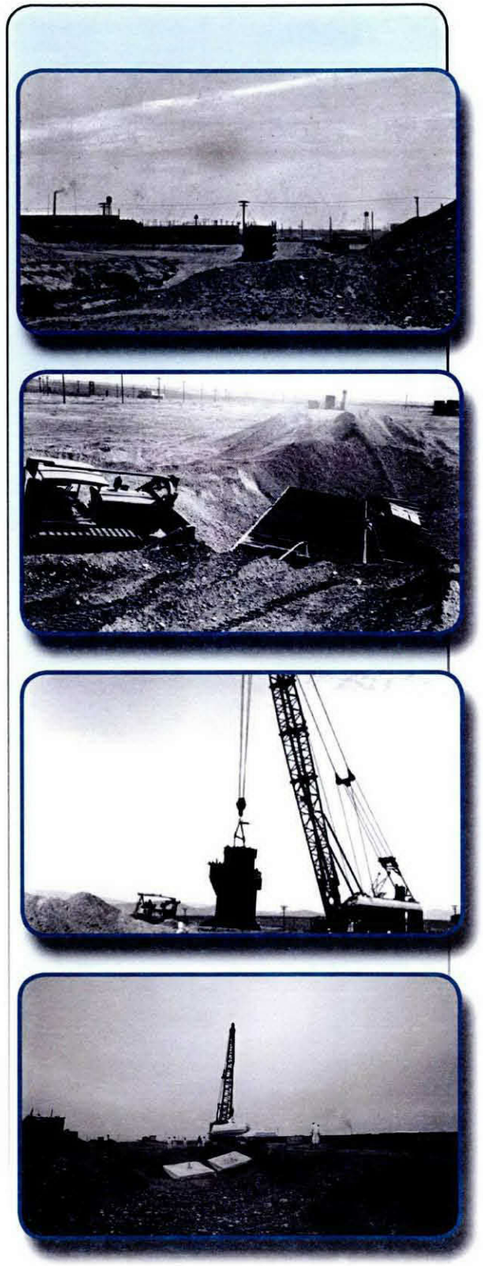


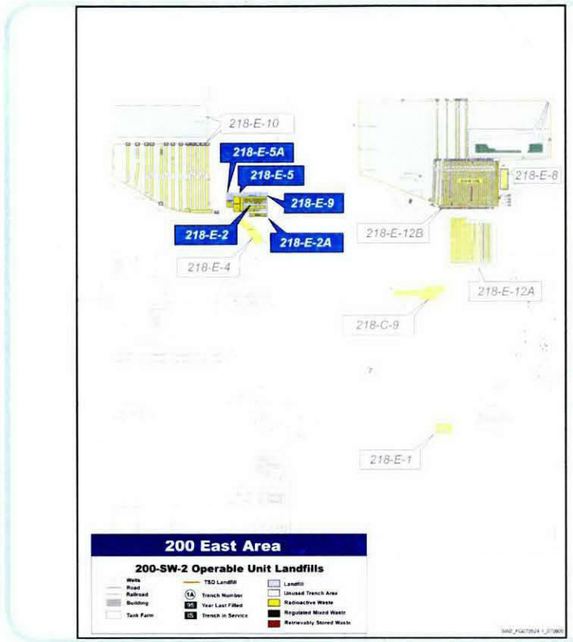


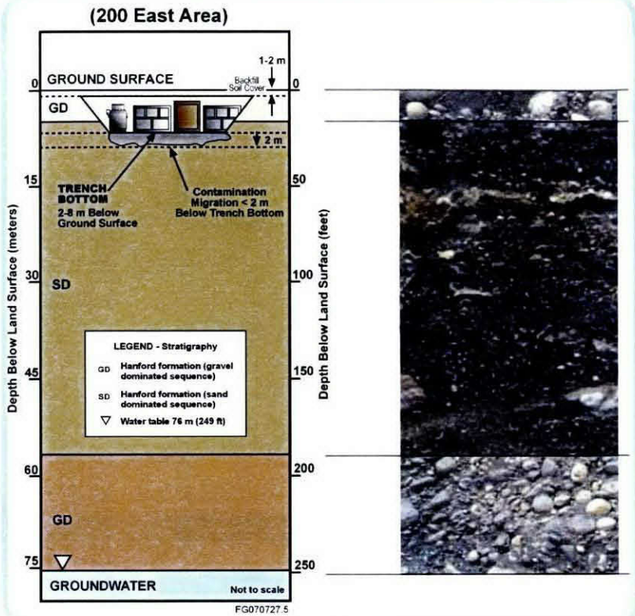
This bin includes the seven 200-SW-2 OU landfills that are permitted as RCRA TSD Unit Landfills and are included in the Low-Level Burial Grounds Dangerous Waste Permit Application, Part A (DOE/RL-88-20, Hanford Facility Dangerous Waste Permit Application, Low-Level Burial Grounds). The majority of available historical documentation for 200-SW-2 Landfills is associated with these sites (approximately 110,000 of 117,000 total documents). These landfills, therefore, are considered the best-documented sites in the scope of the RI/FS work plan. Sites in this bin include the 218-W-3A, 218-W-3AE, 218-W-4B, 218-W-4C, 218-W-5, 218-E-10, and 218-E-12B Landfills. Historical documentation suggests that no burials have been made to several large-area portions of the 218-W-4C, 218-E-10, and 218-E-12B Landfills. The seven landfills and associated in-scope trenches in this bin received waste at various times from 1955 to 2004. Approximately 70 percent of the 200-SW-2 OU's overall waste volume is included in this bin.

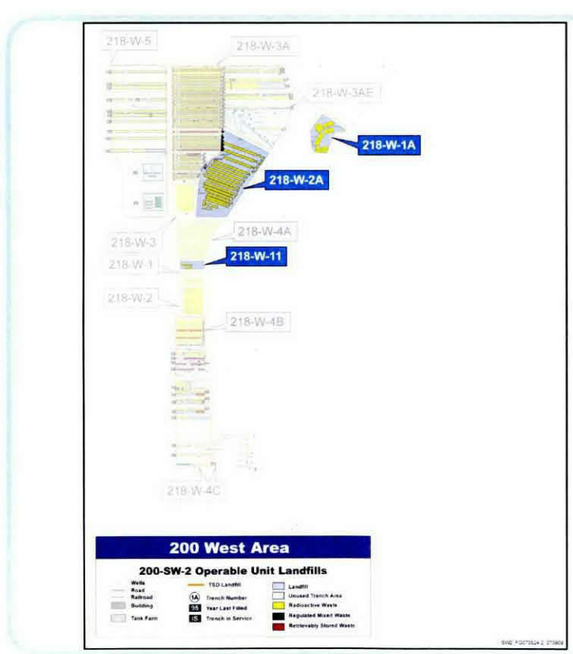
Figure E-3. Initial CSM for BIN 2 Industrial Landfills.

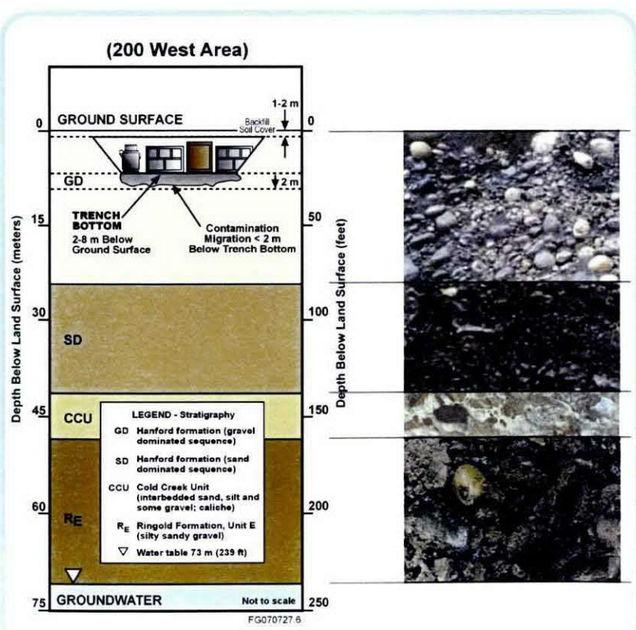
Bin 2
Industrial Landfills







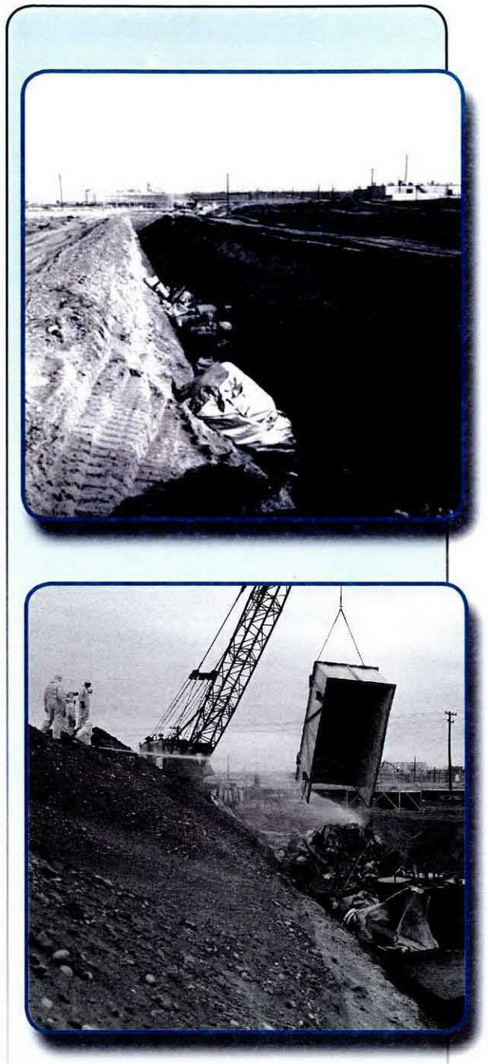


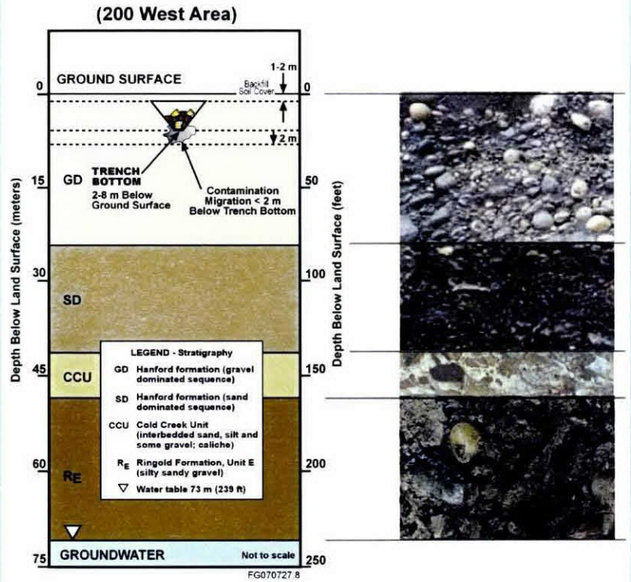


This bin includes eight past practice landfills that received radioactive waste that was generally packaged in large wooden or concrete boxes, containing large quantities of mixed fission products. For the most part, these landfills were dedicated for burial of large pieces of failed or obsolete equipment from the chemical processing facilities. Many of these sites contain burials made over 50 years ago. Historical burial documentation is good for the 218-W-2A and 218-E-5A Landfills; however, historical burial documentation for the remaining sites is at a minimum. Sites in this bin include the 218-W-2A, 218-E-5A, 218-E-2, 218-E-2A, 218-E-5, 218-E-9, 218-W-1A, and 218-W-11 Landfills. The eight landfills included in this bin received waste at various times from 1944 to 1985. Approximately 13 percent of the 200-SW-2 OU's overall waste volume is included in this bin.

Figure E-4. Initial CSM for BIN 3 Dry Waste Alpha Landfills.

Bin 3
Dry Waste Alpha Landfills



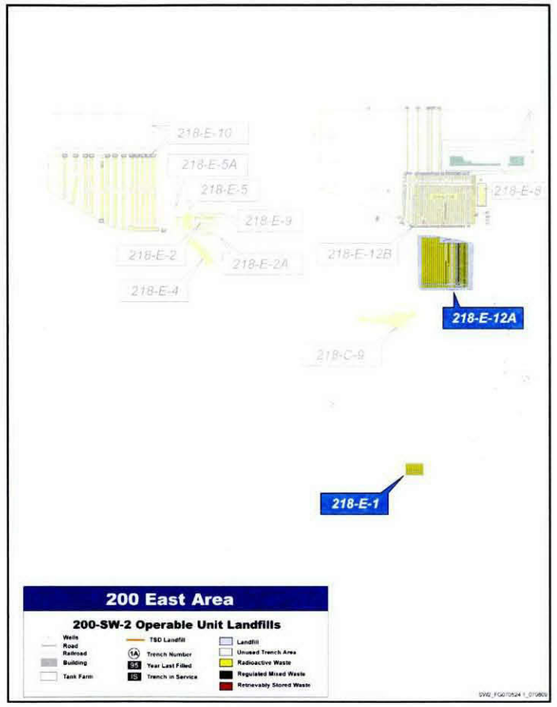


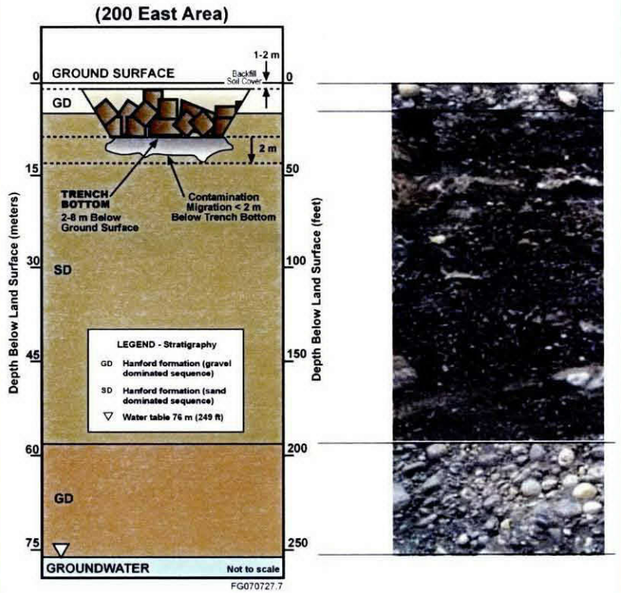
This bin includes four past practice landfills that received radioactive waste packaged primarily in fiberboard or small wooden boxes, wrapped in heavy brown paper or burlap, or placed in the trench without packaging. A small percentage of the waste is packaged in metal drums. All types of miscellaneous wastes, including contaminated soils and potentially contaminated rags, paper, wood, and small pieces of equipment such as tools, have been placed in these sites. Some larger equipment (e.g., several motor vehicles, large canyon-processing equipment) is known to have been disposed to these sites. Available historical documentation suggests that these four sites collectively contain at least 90 percent of the 200 Areas landfill pre-1970 alpha inventory. Available historical documentation for the older landfills (218-W-1 and 218-W-2 Landfills) in this bin generally is poor because these landfills received waste in the 1940s and 1950s. Available historical documents for the newer landfills (218-W-3 and 218-W-4A) in this bin are more numerous, as these two landfills received waste in the mid-1950s to 1960s. The four landfills included in this bin received waste at various times from 1944 to 1968. Approximately 10 percent of the 200-SW-2 OU's overall waste volume is included this bin.

Figure E-5. Initial CSM for BIN 4 Dry Waste Landfills.

Bin 4

Dry Waste Landfills

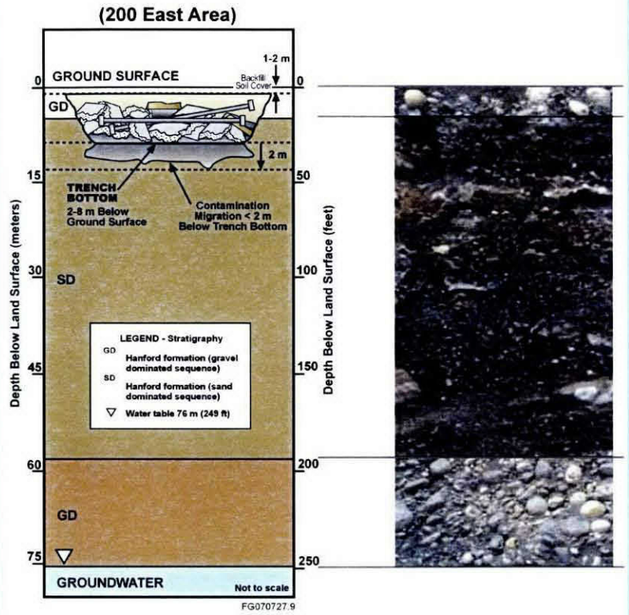




This bin includes two past practice landfills that received radioactive waste packaged primarily in fiberboard or small wooden boxes, wrapped in heavy brown paper or burlap, or placed in the trench without packaging. A small precentage of the waste is packaged in metal drums. All types of miscellaneous wastes, including contaminated soils and potentially contaminated rags, paper, and wood, have been placed in these sites. These sites also contain a few pieces of large equipment such as tank farm pumps. Available historical documentation for these sites is generally poor. Sites included in this bin include 218-E-1 and 218-E-12A Landfills. The two landfills in this bin received waste at various times between 1945 and 1967. Approximately 4 percent of the 200-SW-2 OU's overall waste volume is included in this bin.

Figure E-6. Initial CSM for BIN 5 Construction Landfills.

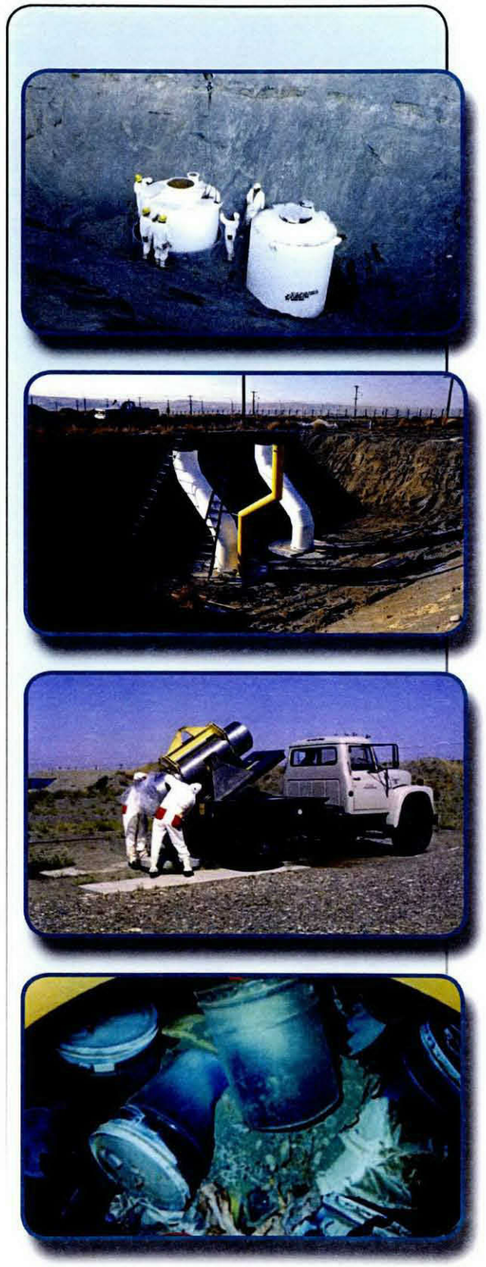
Bin 5 Construction Landfills

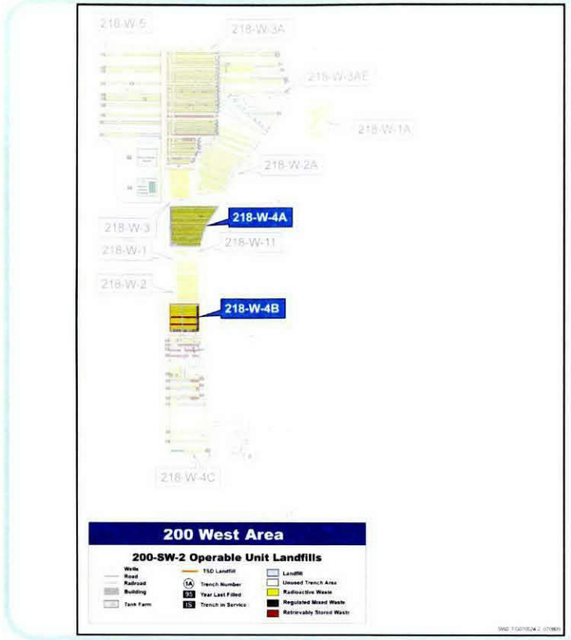


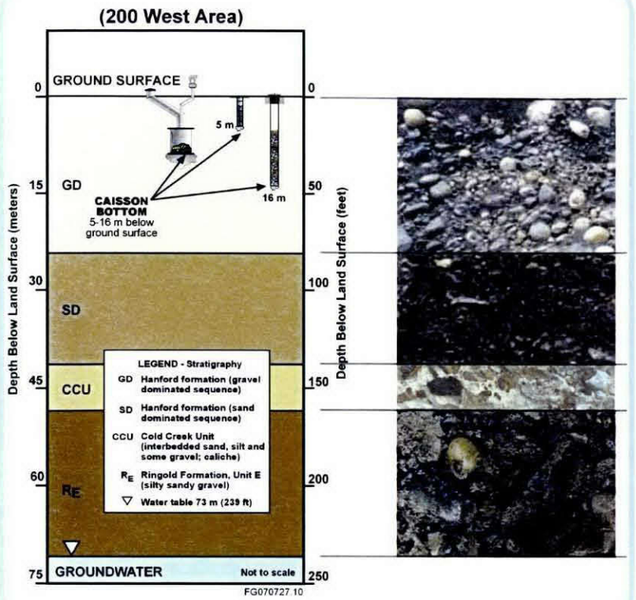
This bin includes three past practice landfills that mainly were limited to burial of wastes resulting from construction work on existing facilities or demolition of surplus facilities. Wastes in these sites are believed to contain very little alpha contamination; beta-gamma contamination is likely also at a minimum. Documentation for 218-C-9 Landfill is believed to be nearly complete; however, few historical documents exist for the 218-E-8 and 218-E-4 Landfills. The three landfills in Bin 5 received waste at various times between 1955 and 1989. Approximately 3 percent of the 200-SW-2 OU's overall waste volume is included this Bin.

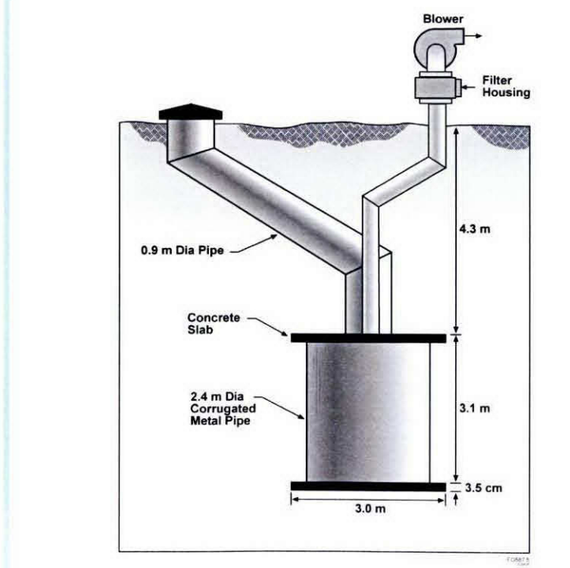
Figure E-7. Initial CSM for BIN 6 Caissons.

Bin 6 Caissons









Caisson Mockup Site

This bin includes fifteen cylindrical containment structures commonly know as caissons and/or vertical pipe units that were used (or intended to be used) for disposal of hot-cell waste or high plutonium concentration waste. The vertical pipe units (sometimes termed caissons) located in the 218-W-4A Landfill were made of welded 208.2 L (55 gal.) drums or corrugated pipe and concrete; the caissons in 218-W-4B Landfill were made of metal and/or concrete. Documentation for the caissons in 218-W-4A Landfill generally is poor, while more documentation exists for the caissons in 218-W-4B Landfill (150 to 250 documents per caisson). Caissons located in this bin include 218-W-4B-C1, 218-W-4B-C2, 218-W-4B-C3, 218-W-4B-C4, 218-W-4B-C5, 218-W-4B-C6, 218-W-4B-CU1, 218-W-4A-C1, 218-W-4A-C2, 218-W-4A-C3, and 218-W-4A-C5 Caissons. This bin also includes some caissons in 218-W-4A and 218-W-4B Landfills that are believed to be empty/unused, according to available historical documentation; caissons that are suspected to be empty include the 218-W-4A-C4, 218-W-4A-C6, 218-W-4A-C7, 218-W-4A-C8, and 218-W4B-Alpha5 Caissons. Waste was disposed in caissons from 1959 to 1990. Approximately 0.01 percent of the 200-SW-2 OU's overall waste volume is included this bin.

Figure E-8. Initial CSM for the 218-C-9 Landfill.

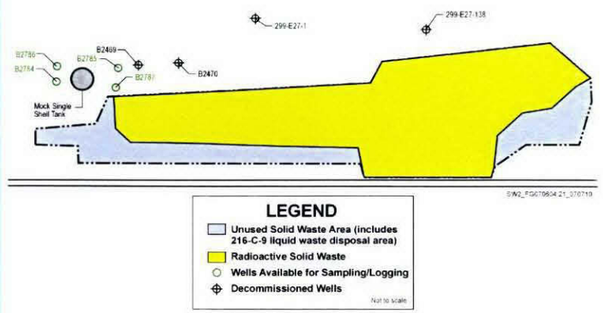
218-C-9

Bin 5 Construction Landfill

Landfill Summary Information

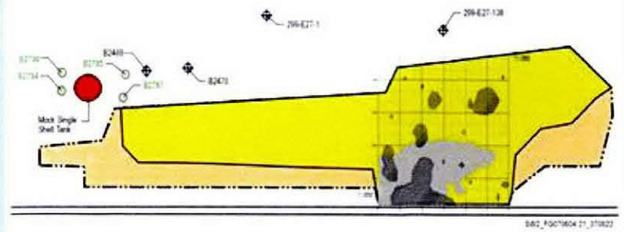
WIDS Code & Aliases	218-C-9, Dry Waste No. 0C9, 218-C-9 Burial Ground
Landfill Type	Construction
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	Liquid discharges 1953 to 1983. Solid waste burial 1985 to 1989
Area & Shape	1.81 ha (4.46 acres) - irregular shape
Location	North of 7th St and north of Hot Semiworks Plant
General Description	The burial pit is located at the site of the dried 216-C-9 Pond. The dried pond was covered with a layer of washed gravel, and material from the deactivation and demolition material of the Hot Semiworks Plant was disposed. In August 1986, a fire was discovered in the burial pit. It was determined that metal frames cut with a torch had been placed in the pit before fully cooling and ignited flammable material. The entire site has been backfilled and surface stabilized. A routine radiological survey is performed annually. Debris at the site consists of radiologically contaminated concrete rubble, large equipment, roofing material, metal scrap, and other Hot Semiworks Plant demolition wastes. Contaminated soil from UN-216-E-37 and UN-216-E-39 also was placed in the pit.
Trenches	1 large pit
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	1 billion L (264 million gal) mildly radioactive steam condensate liquid discharge 7,580 m3 (9,920 yd3) of miscellaneous solid debris and soil. The site contains LLW only. The site contains no Pu, and less than a milligram of U. 43 Ci of Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	Hot Semiworks (201-C) demolition
References	WIDS; Burial Records; H-2-44501 Sheet 93; H-2-44501 Sheet 94; H-2-32523; Interview with JD Anderson 25 July 2005; ARH-1608; Engineering Order No. 19813 dated 10/8/1985; RHO-CD-673

218-C-9 Site Map

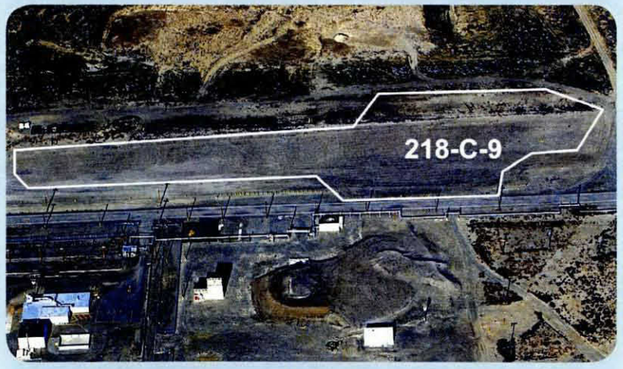


Years of Operation: 1985-1989

Geophysical Anomalies



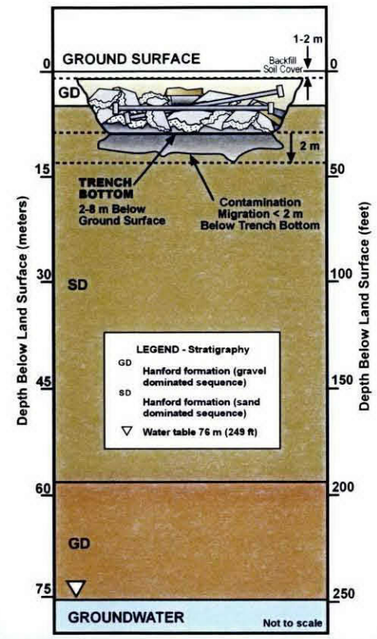
Aerial Photo



Characterization Summary

218-C-9

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Geophysical data indicates that this landfill does not appear to contain large, continuous concentrations of buried objects or debris in well-defined trenches or pits.
  - o See Section 3 for results



- Low activity waste (<100 mR/hr)
- Primarily construction/demolition debris and concrete rubble
- Low potential for subsidence
- Used in past as the 216-C-9 pond

Figure E-11. Initial CSM for the 218-E-1 Landfill.

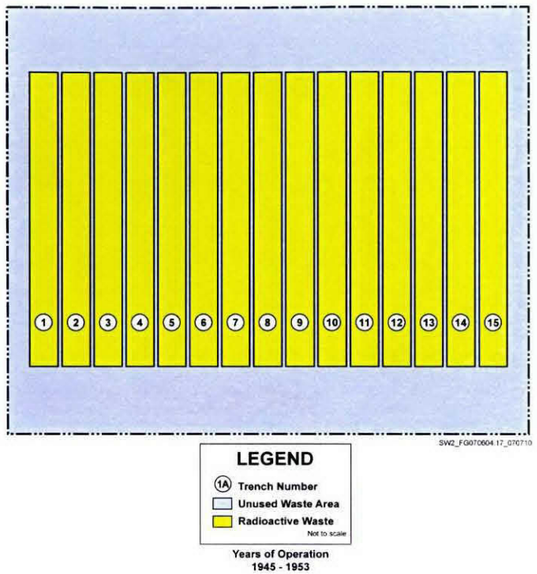
218-E-1

Bin 4 Dry Waste Landfill

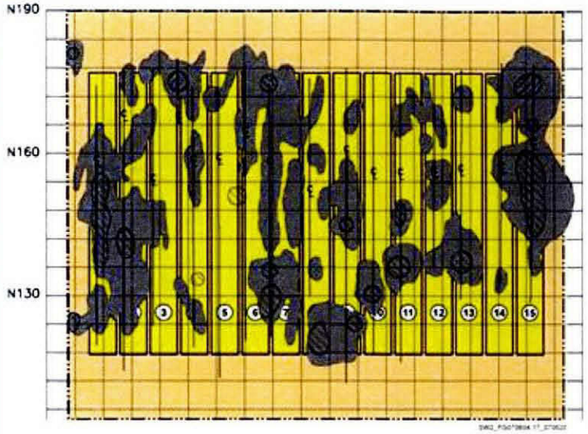
Landfill Summary Information

WIDS Code & Aliases	218-E-1, 200 East Dry Waste No. 001
Landfill Type	Dry Waste
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1945 to 1953
Area & Shape	0.961 ha (2.37 acres) - rectangle
Location	West of PUREX (202-A Building) and south of 4th St
General Description	In 1974, areas with surface depressions were filled to grade with cinders from the 284-E Powerhouse and topped with gravel. In October 1978, an area of previously buried waste was uncovered at the south end of a trench. The contamination was reburied and covered with clean soil. The entire landfill was surface stabilized with 46 cm (18 in.) of clean soil and vegetated with wheat grass.
Trenches	15 north-to-south trenches 61 m (200 ft) long, ranging from 5 m to 6 m (16 ft to 20 ft) wide
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	3,030 m3 (2,317 yd3) dry waste. The site contains unsegregated waste only. 0.9 kg Pu, 400 kg U. 100 Ci of Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area – believed to be mainly B-Plant wastes
References	WIDS; WHC-EP-0912; RHO-CD-673; H-2-124; HW-60807; SWITS; RHO-72710-82-167

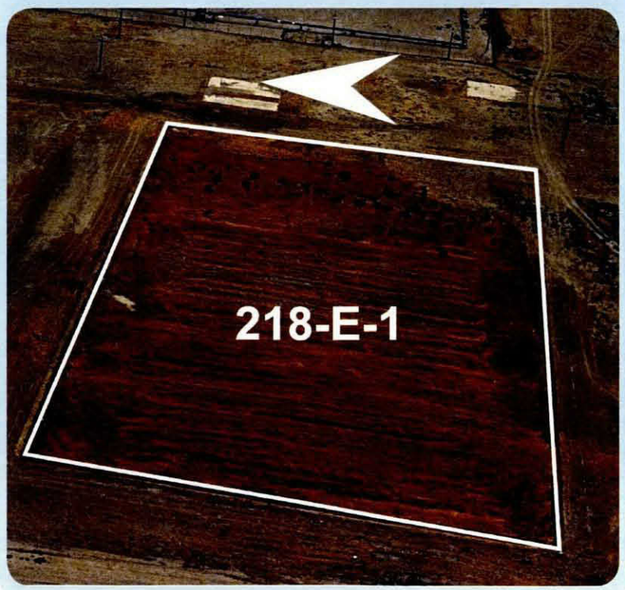
218-E-1 Site Map



Geophysical Anomalies



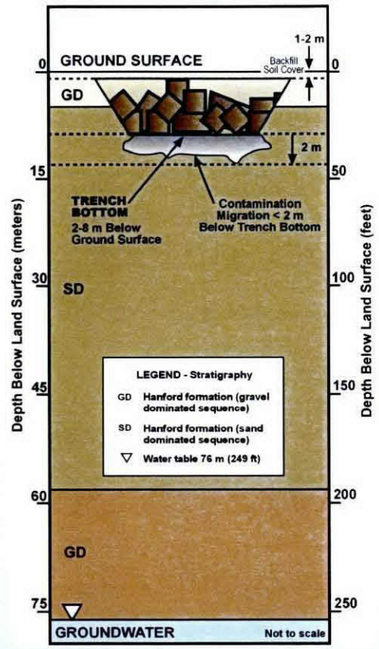
Aerial Photo



Characterization Summary

218-E-1

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Geophysical data indicates that 218-E-1 contains 15 trenches with variable amounts of metallic material contained in each.
  - o The buried material does not appear to be continuous throughout the entire length of most trenches.
  - o See Section 3 for results



- Waste primarily packaged in fiberboard cartons/boxes/drums
- Medium dose rate (up to 2,000 mR/hr)
- Low potential for subsidence
- Primarily beta-gamma contaminated waste.
- Surface stabilized with fly ash

Figure E-10. Initial CSM for the 218-E-2 Landfill.

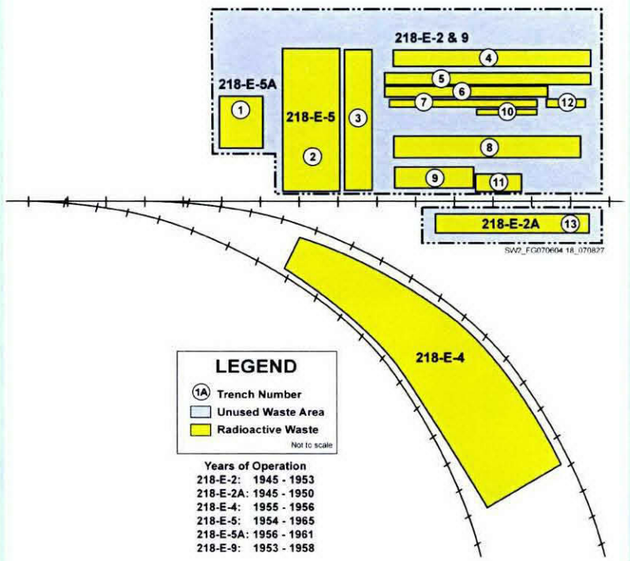
218-E-2

Bin 2 Industrial Landfill

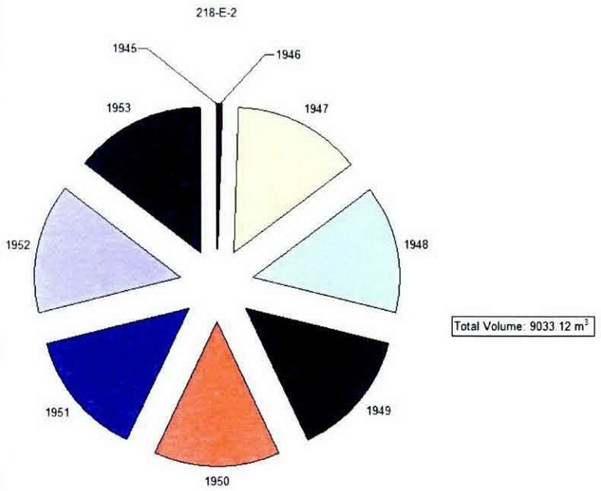
Landfill Summary Information

WIDS Code & Aliases	218-E-2, 200 East Industrial Waste No. 002, Equipment Burial Ground #2
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1945 to 1953
Area & Shape	2.05 ha (5.06 acres) - rectangle
Location	North of B Plant and south of BX Tank Farm; co-located with Landfills 218-E-5, 218-E-5A and 218-E-9
General Description	The unit was surface stabilized in 1979 with 0.3 m (1 ft) of clean backfill material and vegetated with wheat grass. Trench lengths vary from 27 m to 142 m (90 ft to 465 ft). The site is co-located with Landfills 218-E-2A, 218-E-4, 218-E-5, 218-E-5A and 218-E-9.
Trenches	9 industrial (wide) trenches.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	9,033 m3 (11,815 yd3) of industrial wastes. The site contains unsegregated waste only. The site contains 0.8 kg Pu, 300 kg U. 25,000 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area
References	WIDS; SWITS

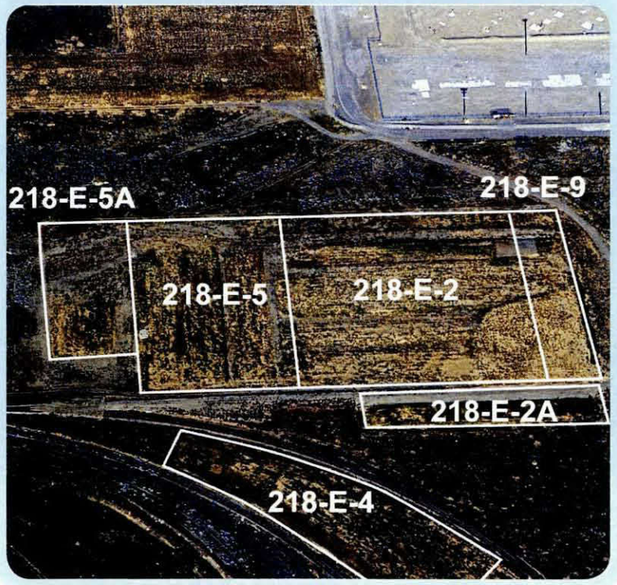
218-E-2 Site Map



Relative Volume of Waste by Year



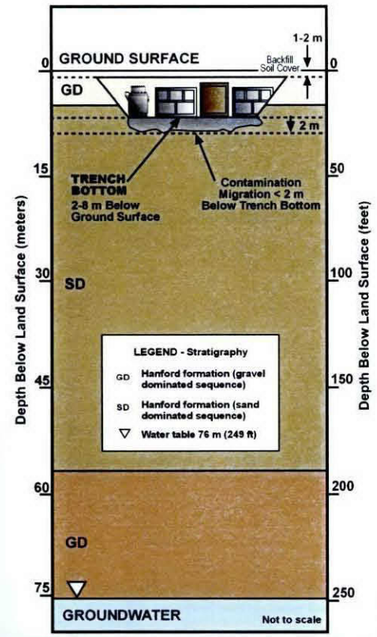
Aerial Photo



Characterization Summary

218-E-2

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface radiological surveys
  - o In September 2006 radiological soil measurements at the 218-E-2 and 218-E-5 Landfills were performed in support of the 200-SW-2 OU non-intrusive characterization effort.
  - o Eight survey locations (hot-spots) were selected for further radiological soil measurements in and around the two landfills, based on previously collected MSCM data.
  - o Cesium contamination appears to be close to the surface and probably not directly related to the landfill.
  - o See section 3 for results



- High internal void volume
- High potential for subsidence
- Disposal of failed/obsolete equipment
- High dose rates
- Waste typically contained in large wooden or concrete boxes

Figure E-11. Initial CSM for the 218-E-2A Landfill.

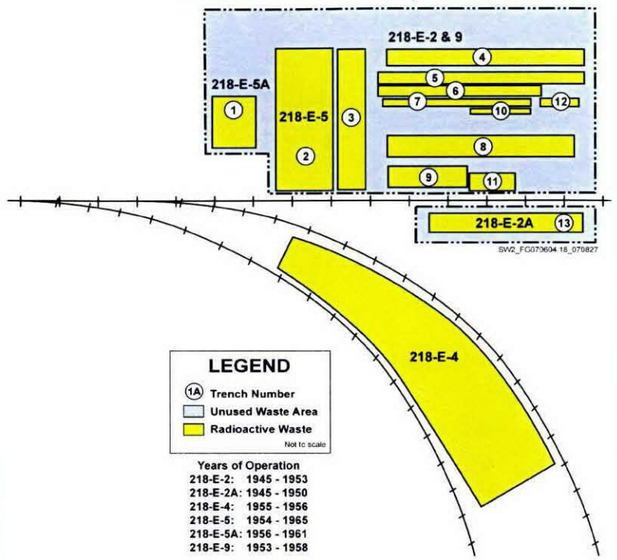
218-E-2A

Bin 2 Industrial Landfill

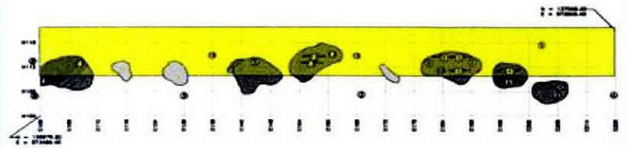
Landfill Summary Information

WIDS Code & Aliases	218-E-2A, Regulated Equipment Storage Site No. 02A, Burial Trench
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1945 to 1950
Area & Shape	0.372 ha (0.918 acres) - rectangle
Location	North of B Plant and south of 218-E-2. A railroad spur separates 218-E-2 from 218-E-2A
General Description	The site was used as an above-ground storage site for contaminated equipment. There are no records or inventories for this site. A 1978 inspection noted a number of sinkholes. During 1979, several loads of soil were placed over the sinkholes, and the stored above-ground equipment was buried in the 218-E-10 Landfill. The site was surface stabilized with 0.3 m (1 ft) of soil, revegetated, and posted/marked as an underground radioactive material area in 1980 to 1981. The site is co-located with Landfills 218-E-2, 218-E-4, 218-E-5, 218-E-5A and 218-E-9.
Trenches	One east-west trench
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	The site contains unsegregated waste only. Nothing is known about waste volume or inventories.
Source Facilities Contributing More than 5% of Waste by Volume	Unknown
References	WIDS; H-2-55534

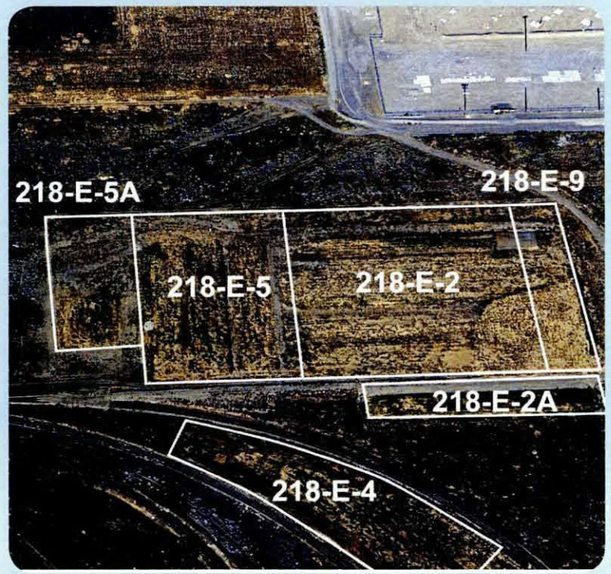
218-E-2A Site Map



Geophysical Anomalies



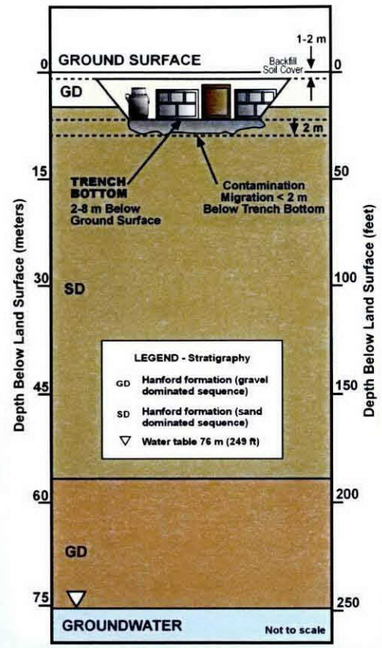
Aerial Photo



Characterization Summary

218-E-2A

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Investigation conducted was an expansion of the area covered in the first phase of geophysical investigations (D&D 28379). Results of the previous investigation appeared to show anomalies extending beyond the edge of the landfill boundary to the west. This investigation concluded no buried debris or objects are interpreted to be west of the landfill boundary.
  - o See Section 3 for results



- Low activity waste (<100 mR/hr)
- Primarily construction/demolition debris and concrete rubble
- Low potential for subsidence
- Believed to be many small burials

Figure E-12. Initial CSM for the 218-E-4 Landfill.

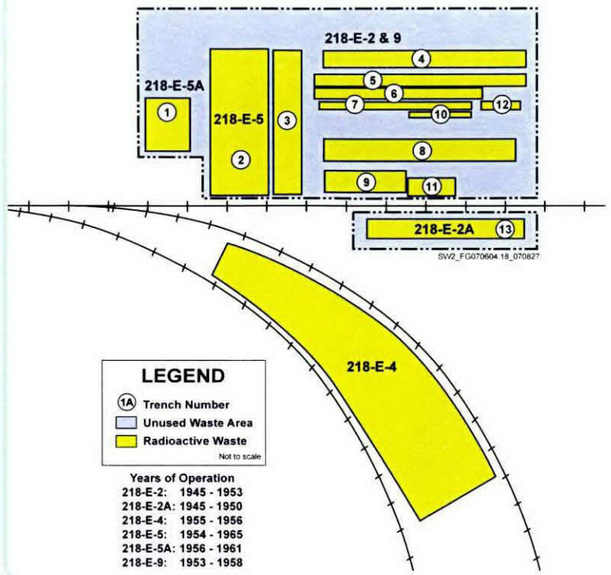
218-E-4

Bin 5 Construction Landfill

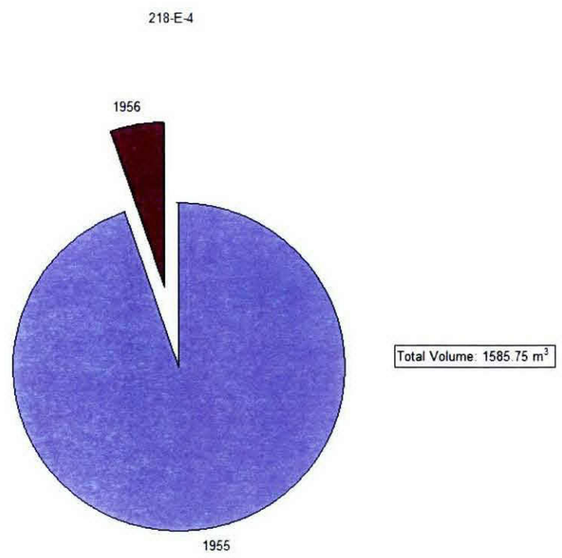
Landfill Summary Information

WIDS Code & Aliases	218-E-4, 200 East Minor Construction No. 4, Equipment Burial Ground #4
Landfill Type	Construction
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1955 to 1956
Area & Shape	1.38 ha (3.41 acres) - irregular shape
Location	Irregularly shaped polygon located between two railroad tracks and north of 221-B Building
General Description	The site received repair and construction waste from the 221-B modifications. In June 1960, UPR-200-E-23 occurred and contaminated the area to a maximum reading of 1 rad/h. The site was surface stabilized in 1980 and is posted as Underground Radioactive Material. A radioactive survey is performed annually. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-5, 218-E-5A, and 218-E-9.
Trenches	The exact number of trenches remains unknown. It is believed that 2 trenches run parallel to the railroad tracks.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	1,586 m3 (2,074 yd3) of mainly construction debris. The site contains .01 kg Pu, 1 kg U. All waste is unsegregated. 10 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area –(B-Plant [221-B] construction and modifications)
References	WIDS; SWITS

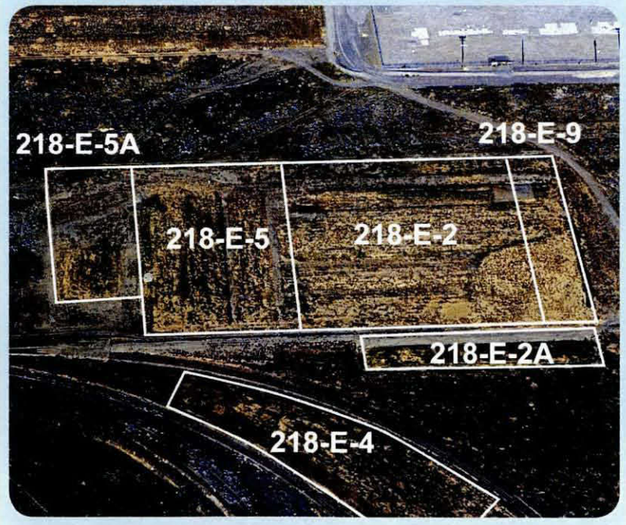
218-E-4 Site Map



Relative Volume of Waste by Year



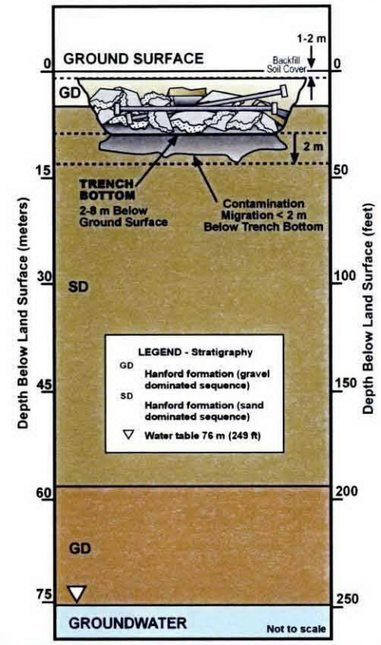
Aerial Photo



Characterization Summary

218-E-4

- Historical documentation review
  - o See Section 5 for a summary of the review process



- Low activity waste (<100 mR/hr)
- Primarily construction/demolition debris and concrete rubble
- Low potential for subsidence
- Believed to be many small burials

Figure E-13. Initial CSM for the 218-E-5 Landfill.

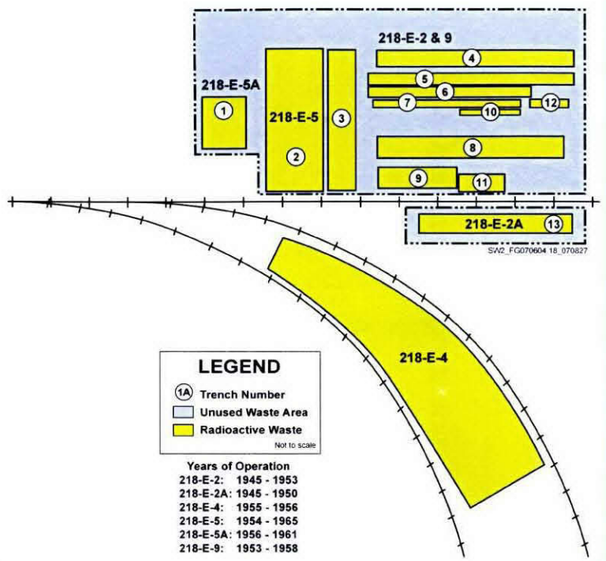
218-E-5

Bin 2 Industrial Landfill

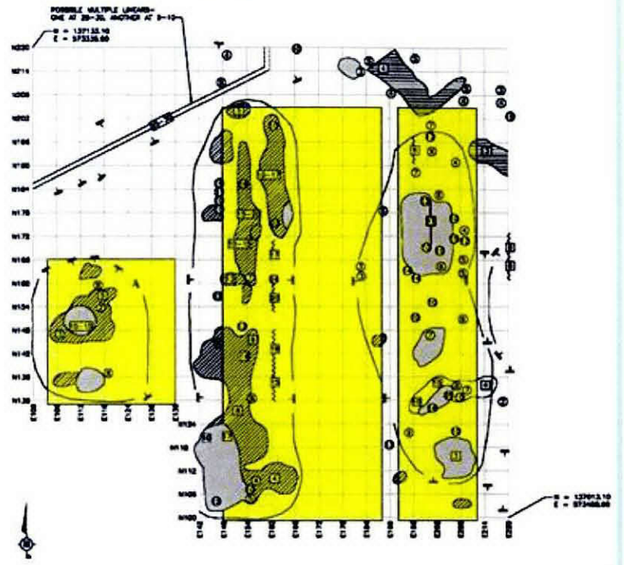
Landfill Summary Information

WIDS Code & Aliases	218-E-5, 200 East Industrial Waste No. 05, Equipment Burial Ground #5
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1954 to 1956
Area & Shape	1.09 ha (2.69 acres) - rectangle
Location	North of B Plant and southwest of BX Tank Farm, adjacent to 218-E-2 Landfill
General Description	The westernmost trench contains railroad boxcars contaminated by uranyl nitrate hexahydrate at the north end. The burial areas were stabilized and covered with 0.3 m (1 ft) of clean soil in 1980. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-4, 218-E-5A and 218-E-9.
Trenches	The site contains two areas of trenches. One area is 104 m (341 ft) long by 40 m (131 ft) wide and contains multiple narrow trenches that received industrial dry waste and small boxes. The second area is a single trench oriented north/south that is 102 m (335 ft) long by 20 m (64 ft) wide.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	3,172 m3 (4,149 yd3) of miscellaneous debris. The site contains unsegregated waste only. The site contains 0.62 kg Pu, 120 kg U. 3,500 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area - PUREX (202-A)
References	WIDS; HW-60807; H-2-55534; RHO-CD-673; SWITS

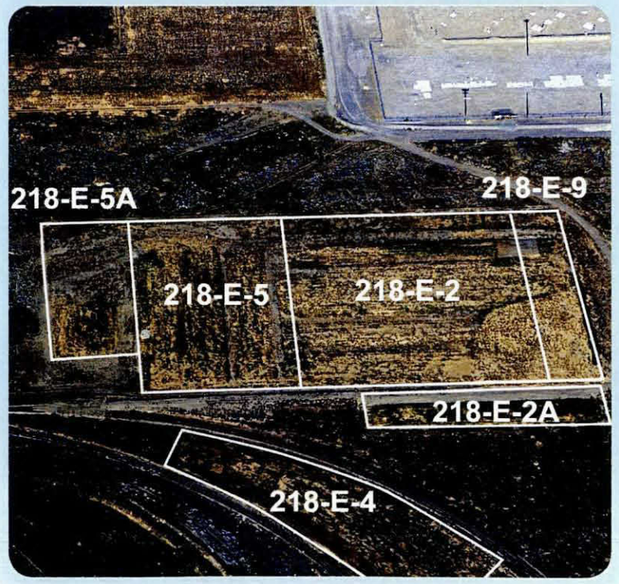
218-E-5 Site Map



Geophysical Anomalies

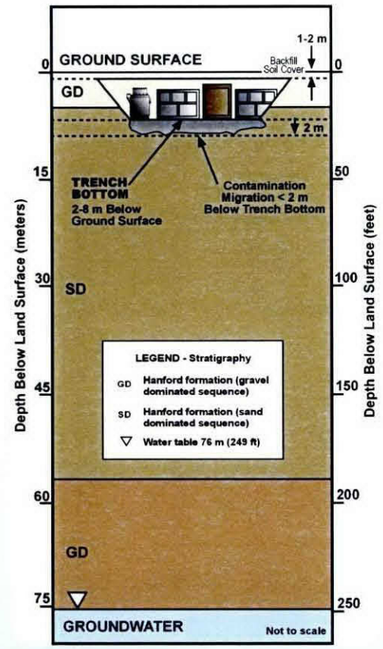


Aerial Photo



218-E-5 Characterization Summary

- Historical documentation review
  - See Section 5 for a summary of the review process
- Surface radiological surveys
  - In September 2006 radiological soil measurements at the 218-E-2 and 218-E-5 Landfills were performed in support of the 200-SW-2 OU non-intrusive characterization effort.
  - Eight survey locations (hot-spots) were selected for further radiological soil measurements in and around the two landfills, based on previously collected MSCM data.
  - Cesium contamination appears to be close to the surface and probably not directly related to the landfill.
  - See section 3 for results
- Surface geophysical surveys
  - The 218-E-5 and 218-E-5A Landfills are contiguous and were investigated as a single landfill. Two trenches are documented in 218-E-5. Trench 2 appears to be roughly 20 m to the west of its documented location. In the eastern half of the landfill, a second trench was detected that correlates well with the documented location of Trench 3 shown on Hanford Site Drawing H-2-55534.
  - See Section 3 for results



- High internal void volume
- High potential for subsidence
- Disposal of failed/obsolete equipment
- High dose rates
- Waste typically contained in large wooden or concrete boxes

Figure E-14. Initial CSM for the 218-E-5A Landfill.

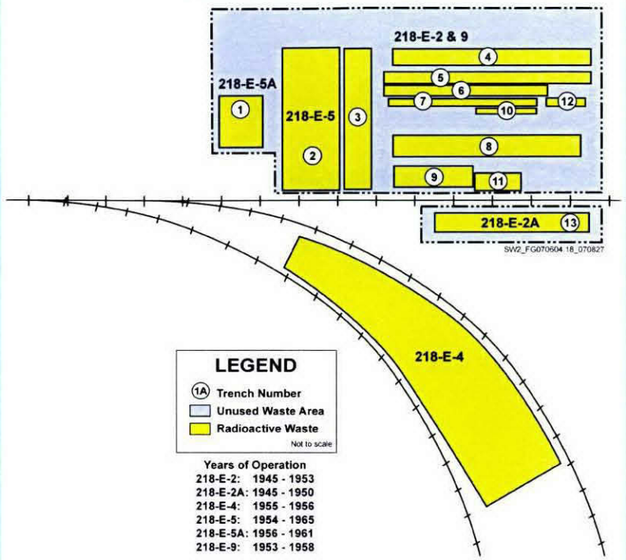
218-E-5A

Bin 2 Industrial Landfill

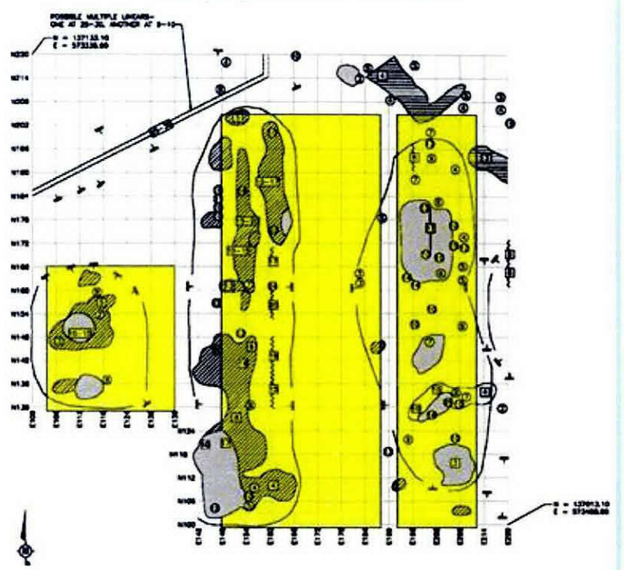
Landfill Summary Information

WIDS Code & Aliases	218-E-5A, 200 East Industrial Waste No. 005A, Equipment Burial Ground #5A
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1956 to 1961
Area & Shape	1.42 ha (3.51 acres) - rectangle
Location	North of B Plant and southwest of BX Tank Farm, adjacent to the 218-E-5 Landfill
General Description	Literature indicates that the site contains wooden boxes of spent PUREX equipment. The trench was backfilled in 1961. The site was stabilized in 1980, covered with 1 ft of clean backfill, and revegetated. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-4, 218-E-5, and 218-E-9.
Trenches	Probably one large pit.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	6,173 m3 (8,740 yd3) of PUREX failed equipment. The site contains unsegregated waste only. The site contains 1.38 kg Pu, 120 kg U. 16,500 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area - PUREX (202-A)
References	WIDS; HW-60807; H-2-55534; 218-E-5A Logbook; HW-63703; RHO-CD-673; PNL-6456; SWITS

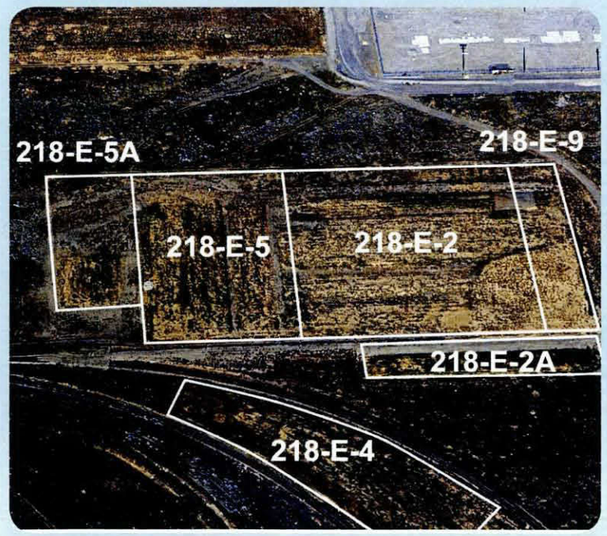
218-E-5A Site Map



Geophysical Anomalies



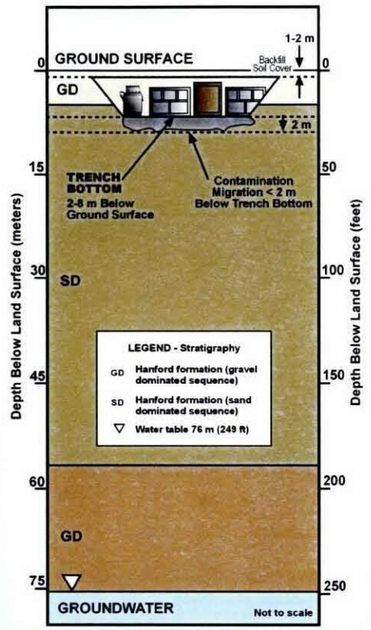
Aerial Photo



Characterization Summary

218-E-5A

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o The 218-E-5 and 218-E-5A Landfills are contiguous and were investigated as a single landfill. Data indicates that there is one trench in the 218 E 5A Landfill; an oblong-shape trench or pit containing a significant amount of metallic debris or objects.
  - o See Section 3 for results



- High internal void volume
- High potential for subsidence
- Disposal of failed/obsolete equipment
- High dose rates
- Waste typically contained in large wooden or concrete boxes

Figure E-15. Initial CSM for the 218-E-8 Landfill.

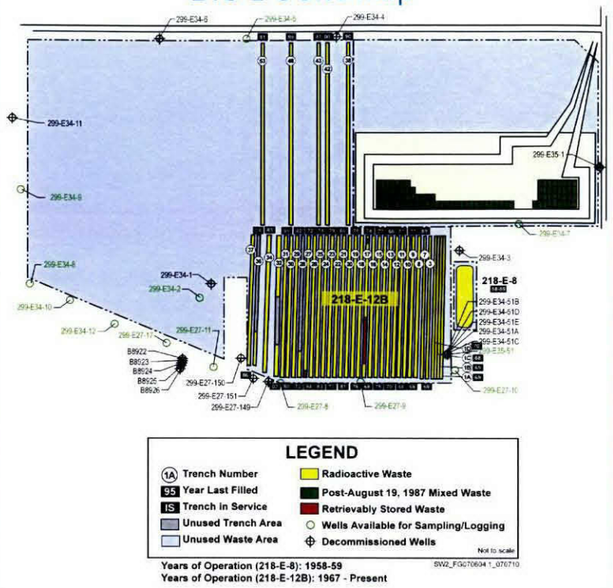
218-E-8

Bin 5 Construction Landfill

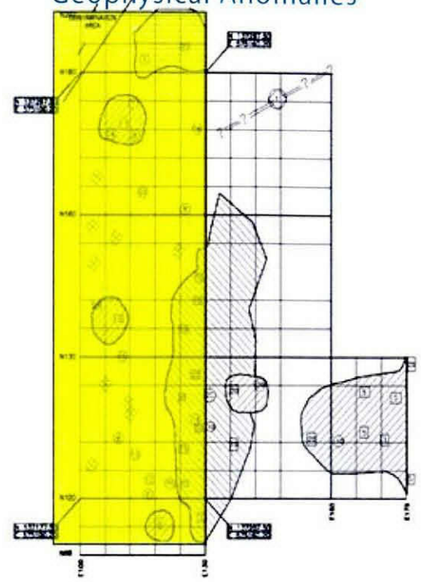
Landfill Summary Information

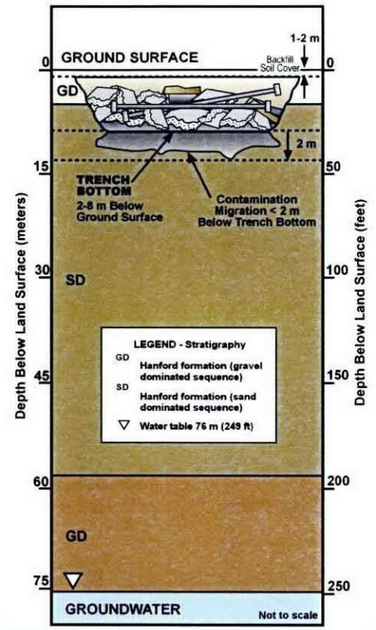
WIDS Code & Aliases	218-E-8, 200 East Construction Burial Grounds
Landfill Type	Construction
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1958 to 1959
Area & Shape	0.444 ha (1.10 acres) - rectangle
Location	North of the 218-E-12A, on the hillside adjacent to the 218-E-12B Landfill
General Description	In 1979, contaminated tumbleweed fragments were found that had blown in and accumulated inside the site and along the west boundary. The trenches were backfilled, and the site was surface stabilized in 1980. An annual radiological survey is performed. Debris included construction and repair wastes from 293-A Building and the PUREX crane addition.
Trenches	The site consists of an unknown number of trenches.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	2,265 m 3 (2,963 yd3) miscellaneous solid construction debris. The site contains unsegregated waste only. The site contains 0.02 kg Pu, 2 kg U. 10 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area - PUREX (202-A and 293-A)
References	WIDS; HW-60807; BHI-00178; H-2-33276 Sheet 2; H-2-33276 Sheet 5; PNL-6456; SWITS

218-E-8 Site Map



Geophysical Anomalies





Aerial Photo

Characterization Summary

218-E-8

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Most of the landfill shows a scattering of anomalies of variable concentrations. A significant pit of buried debris, not fully characterized by this investigation, was located approximately 60 m east of the landfill.
  - o See Section 3 for results

- Low activity waste (<100 mR/hr)
- Primarily construction/demolition debris and concrete rubble
- Low potential for subsidence

Figure E-16. Initial CSM for the 218-E-9 Landfill.

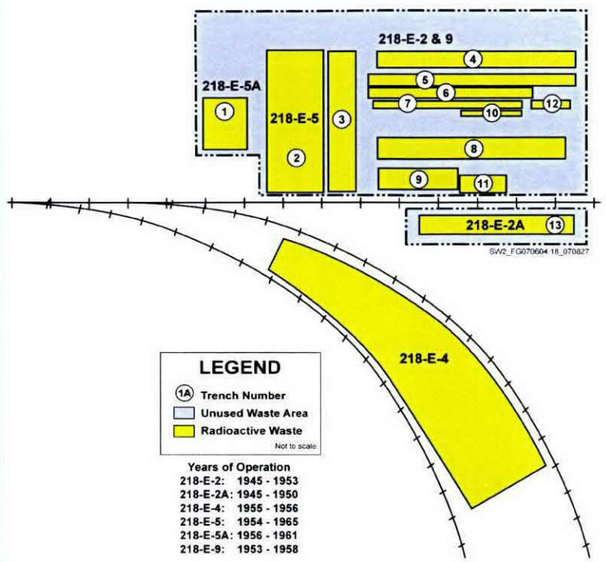
218-E-9

Bin 2 Industrial Landfill

Landfill Summary Information

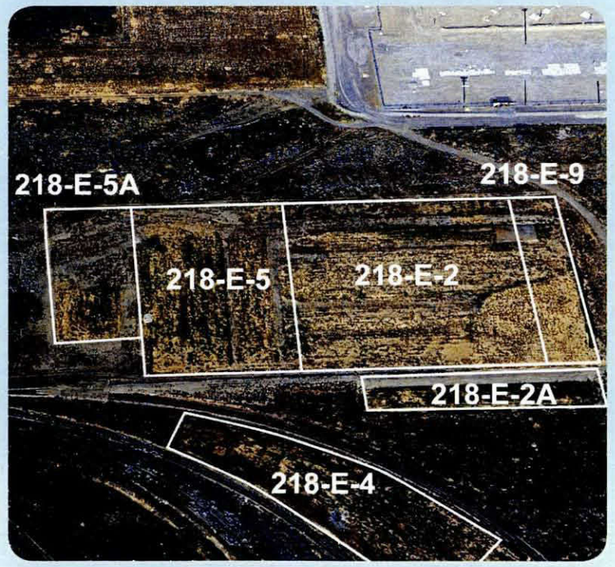
WIDS Code & Aliases	218-E-9, 200 East Regulated Equipment Storage Site No. 009, Burial Vault (HISS)
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1953 to 1958
Area & Shape	0.572 ha (1.41 acres) - rectangle
Location	North of B Plant and east of the 218-E-2 Landfill
General Description	The site was used as an above-ground storage site for fission product equipment that became contaminated in the Uranium Recovery Process operations at tank farms. It is not certain that it ever was used as a landfill. The site is co-located with Landfills 218-E-2, 218-E-2A, 218-E-4, 218-E-5, and 218-E-5A and stabilized in 1980. The site was re-stabilized in 1991 when contaminated vegetation was found.
Trenches	The site consists of an unknown number of trenches. Some overlap with trenches in 218-E-2.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	Equipment. Nothing is known about the waste volume or contaminant inventory. The site contains unsegregated waste only.
Source Facilities Contributing More than 5% of Waste by Volume	Unknown – believed to be uranium-recovery process operations at tank farms
References	WIDS; RHO-CD-673; H-2-55534

218-E-9 Site Map



Aerial Photo

Aerial Photo

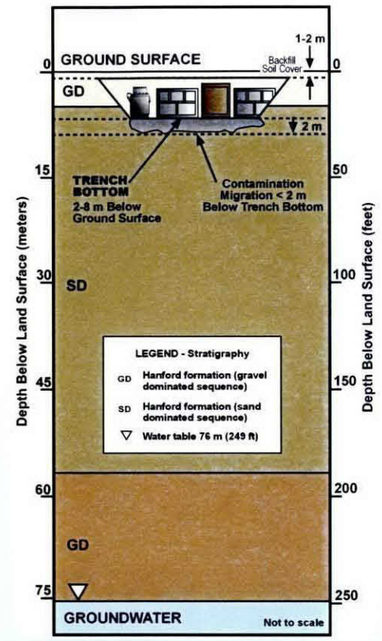


Characterization Summary

218-E-9

- Historical documentation review
  - o See Section 5 for a summary of the review process

* historical document(s) indicate that 218-E-9 is located as shown in the aerial photo but that there is uncertainty in its actual location (which is more likely to be the area east of trench 11)



- High internal void volume
- High potential for subsidence
- Disposal of failed/obsolete equipment
- High dose rates
- Waste typically contained in large wooden or concrete boxes
- Used for above ground storage of waste

Figure E-17. Initial CSM for the 218-E-10 Landfill.

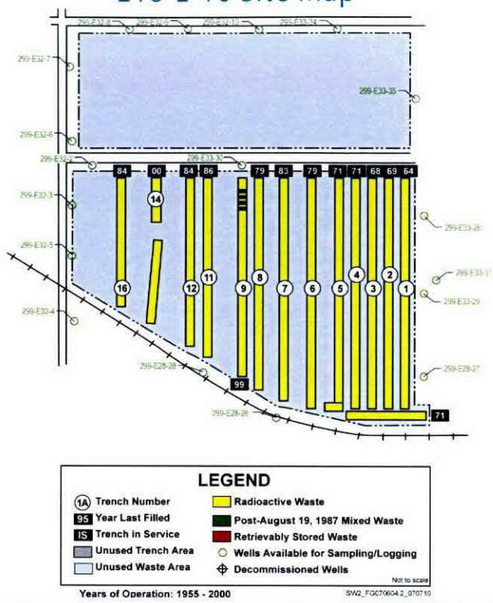
218-E-10

Bin 1 TSD Unit Landfill

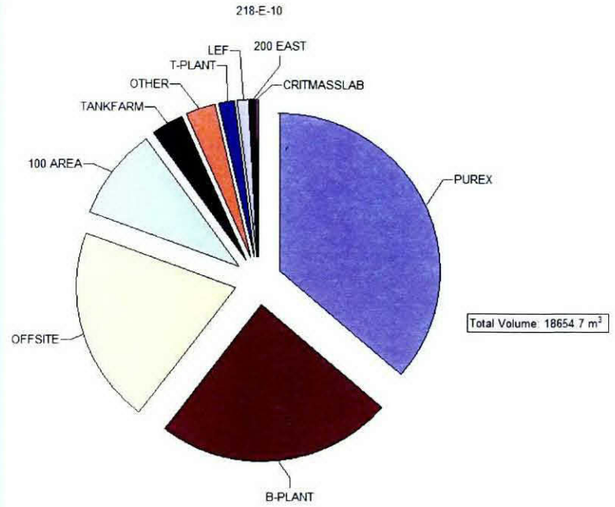
Landfill Summary Information

WIDS Code & Aliases	218-E-10, 200 East Industrial Waste No. 10, Equipment Burial Ground #10
Landfill Type	Industrial
OU & Category	200-SW-2, TSD Unit
Dates of Waste Receipt	1955 to 2000
Area & Shape	22.9 ha (56.6 acres) - irregular shape
Location	Northwest of B Plant and directly west of the 218-E-5A Landfill
General Description	Wastes disposed to the site include cover blocks, tube bundles, jumper vessels, pumps, columns, and filters. In June 1960, a partially covered burial box of PUREX tube bundles caused an airborne contamination spread (UPR-200-E-23). In 1980, Trenches 1 through 5 were backfilled and stabilized. The section was vegetated with grasses. Surface stabilization also was completed for the eastern 10 ha (25 acres) in 1980.
Trenches	Landfill consists of 13 trenches running north–south and one trench running east-west. Trenches range from 264 m to 433 m (865 ft to 1,420 ft) long by 4.6 m to 5 m (15 ft to 16 ft) wide at the bottom.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	26,900 m 3 (35,200 yd3) of equipment/industrial wastes. The site contains LLW, MLLW, and unsegregated waste. The site contains 4.94 kg Pu, 801 kg U. 4,700,00 Ci Beta-Gamma at burial. Contaminants include asbestos, lead, and di-n-octyl phthalate.
Source Facilities Contributing More than 5% of Waste by Volume	100 Area, B-Plant (221-B/224-B), Offsite, PUREX (202-A)
References	WIDS; HW-60807; H-2-58025; DOE/RL-2000-70; H-2-92004; DOE/RL-88-21 Release 22 Low Level Burial Grounds Rev. 11 12/23/98; SWITS

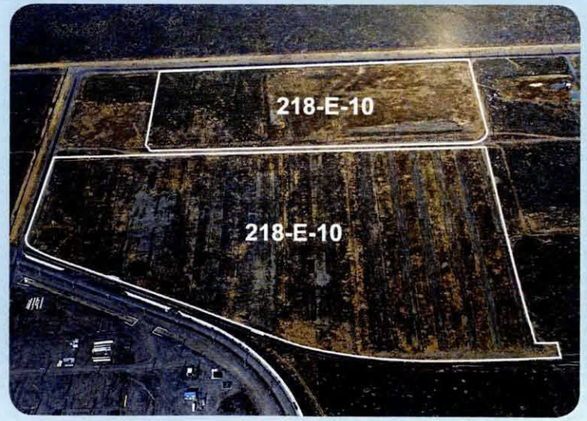
218-E-10 Site Map



Relative Volume of Waste by Generator



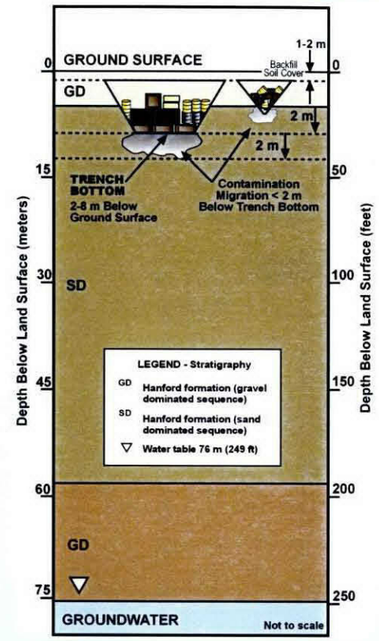
Aerial Photo



Characterization Summary

218-E-10

- Historical documentation review
  - o See Section 5 for a summary of the review process
- RCRA groundwater monitoring
  - o LLWMA 1- monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site specific parameters as required by WAC 173-303-400(3).
  - o See section 3 for results



- Under LLBG Dangerous Waste Permit Application - Part A
- Potential for small volume, sorbed, containerized liquids
- Potential for subsidence
- High dose rates
- Northern portion believed unused; will be verified by field walk downs and/or geophysics

Figure E-18. Initial CSM for the 218-E-12A Landfill.

218-E-12A

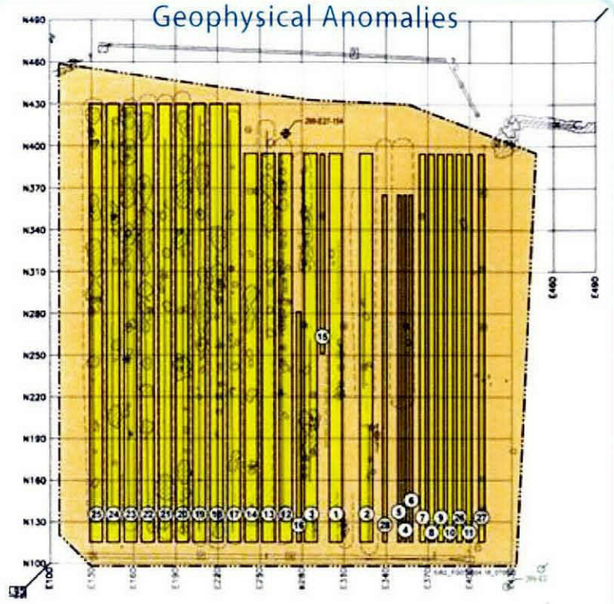
Bin 4 Dry Waste Landfill

Landfill Summary Information

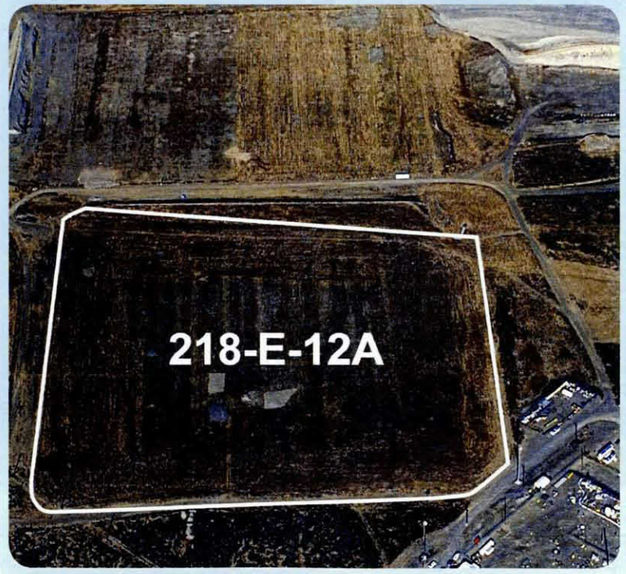
WIDS Code & Aliases	218-E-12A, 200 East Dry Waste No. 12A
Landfill Type	Dry Waste
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1953 to 1967
Area & Shape	12.1 ha (30.0 acres) - nearly rectangular
Location	Northwest of the C Tank Farm and south of 218-E-12B Landfill
General Description	The site received cardboard boxes and plastic bags of radioactive waste. Trenches 4 through 11, 15, 16, and 26 through 28 contain acid-soaked material. The specific contents of Trench 28 are not listed. A waste inventory logbook documents burials of tank farm dip tubes, an impact wrench, contaminated cable, jumpers, animal carcasses from 108-F, and an off-site shipment of depleted uranium. The trenches were backfilled, and stabilization occurred in 1979 and 1980. Biobarriers installed at the site included polyethylene liners and ureabor (herbicide) to kill vegetation. The site was stabilized again in 1994 with 46 cm to 61 cm (19.8 in. to 24 in.) of clean fill.
Trenches	28 burial trenches
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	15,300 m3 (20,000 yd3) of dry waste. The site contains unsegregated waste only. The site contains 8.9 kg Pu, 995 kg U. 890 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area
References	WIDS; HW-60807; H-2-32560; 218-E-12A Logbook; PNL-6456; SWITS

218-E-12A Site Map

Geophysical Anomalies

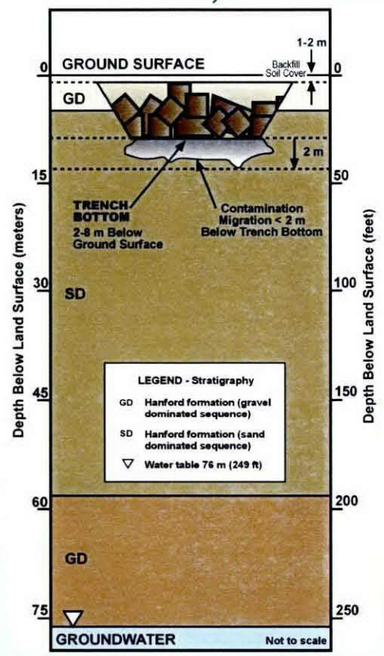


Aerial Photo



218-E-12A Characterization Summary

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o In all of the dry waste trenches, concentrations of metallic waste were identified. Because of the depth of burial of the debris in trenches and the marginally favorable soil conditions, it is assumed that there is more debris in the trenches than was detected in the data.
  - o All of the acid trenches are documented as being in the eastern half of the landfill where the soil conditions are least favorable to GPR.
  - o See Section 3 for results



- Waste primarily packaged in fiberboard cartons/boxes/drums
- Medium dose rate (up to 2,000 mR/hr)
- Low potential for subsidence
- Primarily beta-gamma contaminated waste
- Contains several trenches that contain acid soaked material most likely from decontamination activities at the PUREX facility

Figure E-19. Initial CSM for the 218-E-12B Landfill.

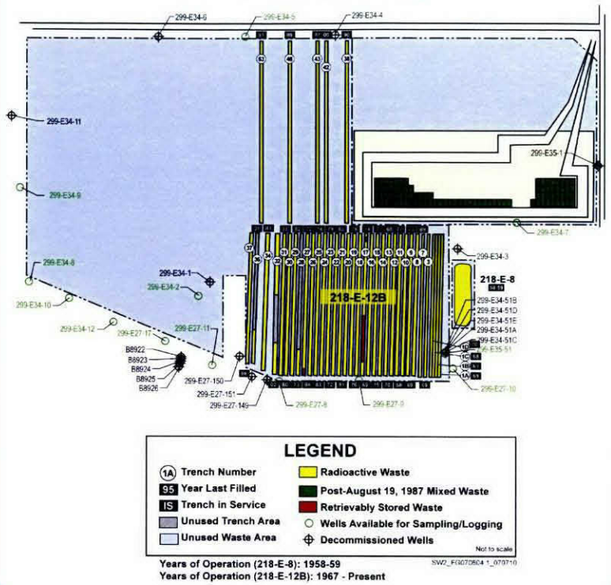
218-E-12B

Bin 1 TSD Unit Landfill

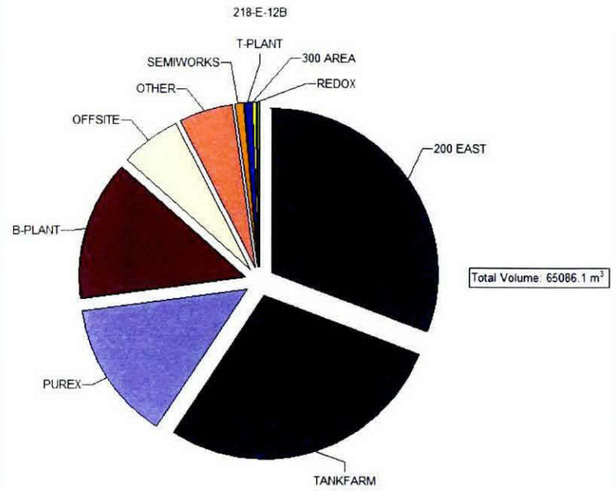
Landfill Summary Information

WIDS Code & Aliases	218-E-12B, 200 East Dry Waste No. 12B
Landfill Type	Dry Waste
OU & Category	200-SW-2, TSD Unit
Dates of Waste Receipt	1967 to present
Area & Shape	73.6 ha (182 acres) - irregular shape
Location	North of the C Tank Farm and south of 12th St
General Description	The southern portion of the site (Trenches 1 through 17) were interim stabilized in 1981 with clean fill. In January 2000, two contaminated tumbleweeds were removed from the site.
Trenches	The landfill has the design capacity for 138 trenches running north to south. 38 trenches are filled, 2 were partially filled, and one was excavated and never used. The remaining trenches were never excavated.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	65,600 m3 (85,800 yd3) industrial wastes. The site contains unsegregated, low-level, and transuranic wastes. In-scope wastes contains 1.39 kg Pu, 7.64 kg U. 183,000 Ci Beta-Gamma at burial. These inventories do not include Trench 94, containing U.S. Navy submarine reactor compartments, nor post-1970 TRU, which are out of scope of this project.
Source Facilities Contributing More than 5% of Waste by Volume	200 East Area, B-Plant, Offsite, PUREX, Tank Farms
References	WIDS; WHC-EP-0912; H-2-33276 Sheet 1; DOE/RL-88-20, Rev. 1, Low Level Burial Grounds Rev. 10, 7/25/97

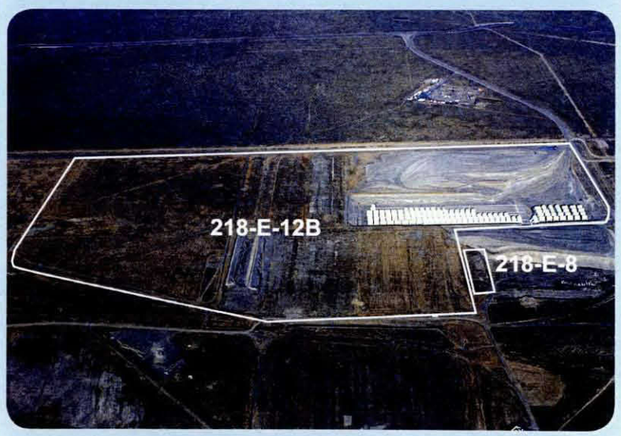
218-E-12B Site Map



Relative Volume of Waste by Generator



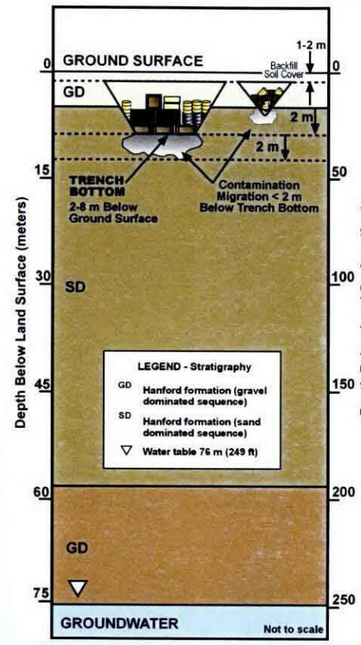
Aerial Photo



Characterization Summary

218-E-12B

- Historical documentation review
  - o See Section 5 for a summary of the review process
- RCRA groundwater monitoring
  - o LLWMA 2- monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site specific parameters as required by WAC 173-303-400(3).
  - o See section 3 for results



- Under LLBG Dangerous Waste Permit Application - Part A
- Contains retrievably stored TRU waste (M-91 Project)
- Potential for small volume, sorbed, containerized liquids
- Potential for subsidence
- High dose rates
- Small portion of landfill affected by past seepage from B-Ditch
- Decommissioned naval reactor compartments in trench 94 are out of scope
- Western portion believed unused; will be verified by field walk downs and/or geophysics

Figure E-20. Initial CSM for the 218-W-1 Landfill.

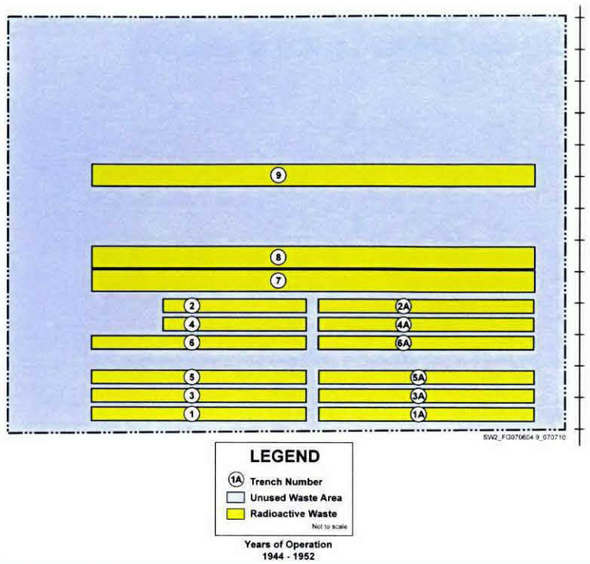
218-W-1

Bin 3 Dry Waste Alpha Landfill

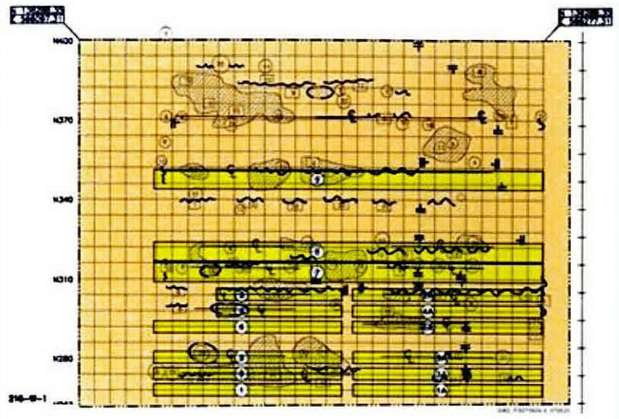
Landfill Summary Information

WIDS Code & Aliases	218-W-1, 200-W Area Dry Waste No. 001, Solid Waste Burial Ground #1
Landfill Type	Dry Waste
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1944 to 1952
Area & Shape	3.32 ha (8.19 acres) - rectangle
Location	Northwest of the 234-5Z Building; east of Dayton Ave, between the 218-W-2 and 218-W-11 Landfills
General Description	"V" trenches typically were used to dispose of small contaminated articles such as paper, filters, and small pieces of equipment. The flat-bottom trenches contain large pieces of contaminated equipment and wooden, metal, and concrete burial boxes. The trenches have been backfilled, and the site was stabilized in 1983. A surface radiological survey is performed annually.
Trenches	The site contains 15 trenches that run east to west. Twelve trenches are "V" shaped 2.4 m (8 ft) deep and 5 m (16 ft) wide at ground level. The other three trenches are flat-bottomed at 2.7 m (9 ft) deep and 7.3 m (24 ft) wide at the surface.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	7,164 m3 (9,370 yd3) dry waste. The site contains unsegregated waste only. The site contains 94 kg Pu, 700 kg U. 200 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 West Area
References	WIDS; H-2-75149; SWITS; DDTS-GENERATED-5634; DDTS-GENERATED-5635; DDTS-GENERATED-5636; DDTS-GENERATED-5637; DDTS-GENERATED-5640; HAN-95462

218-W-1 Site Map



Geophysical Anomalies

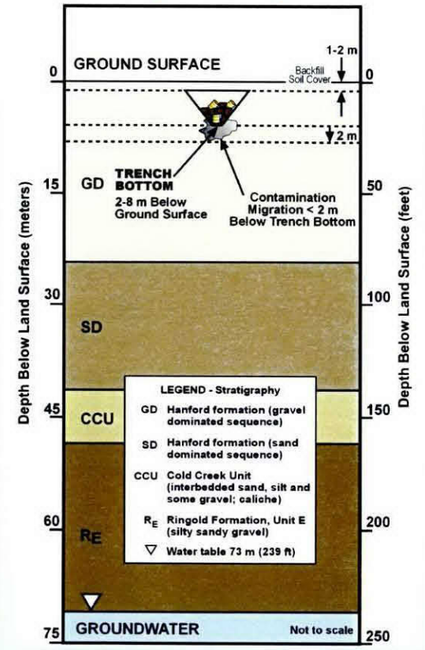


Aerial Photo

Characterization Summary

218-W-1

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Geophysical data for 218 W 1 indicates pockets of debris in each of the identified trenches. Discrete concentrations of metal lic waste were identified in most of the trenches.
  - o Three East-West-oriented trenches were identified that are not shown on Hanford Site Drawing H-2-75149. They are north of the northernmost trench shown on the drawing (Trench 9) and south of the 218-W-11 Landfill.
  - o See Section 3 for results



- One of four landfills believed to contain ~ 90% of the pre-1970 alpha contaminated LLW
- Waste primarily packaged in fiberboard cartons/boxes/drums
- Low potential for subsidence

Figure E-21. Initial CSM for the 218-W-1A Landfill.

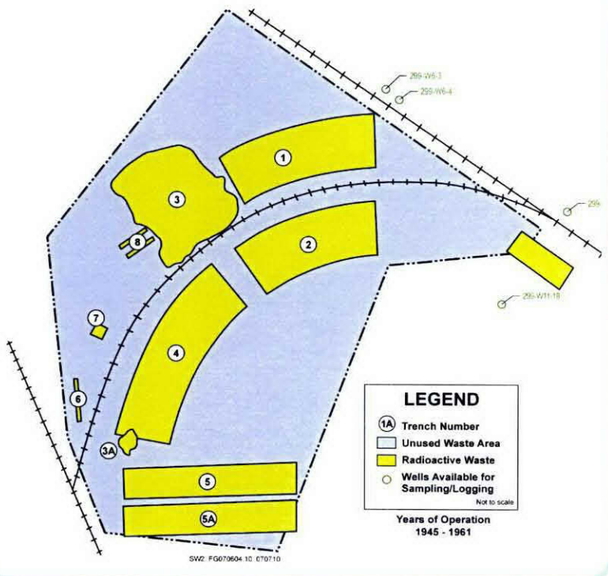
218-W-1A

Bin 2 Industrial Landfill

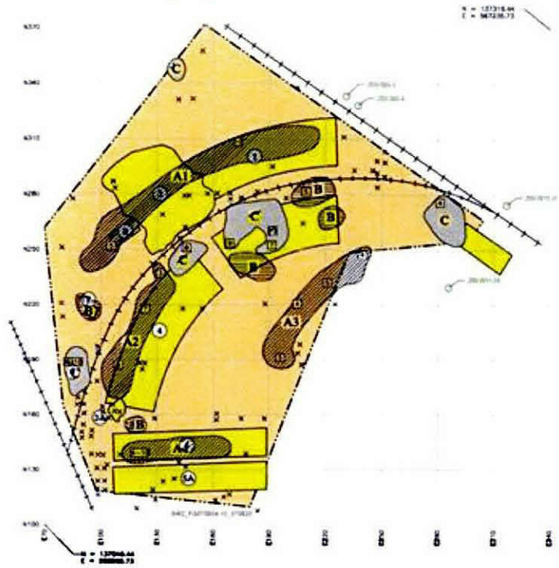
Landfill Summary Information

WIDS Code & Aliases	218-W-1A, 200-W Area Industrial Waste Burial Ground #1, Equipment Burial Ground #1
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1945 to 1961
Area & Shape	4.86 ha (12.0 acres) - irregular shape
Location	Northwest of 221-T, between two railroad spurs
General Description	The site is the first landfill in the 200 West Area to receive large, contaminated equipment. Most of the equipment was disposed in wooden boxes that eventually rotted and settled, creating sinkholes. The sinkholes were filled in 1975 with 1.8 m (6-ft) thick concrete cell blocks and clean fill. Radiological surveys are performed annually.
Trenches	The site contains approximately ten burial areas. The areas include typical trenches and "burial holes." The exact locations of the holes are not known.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	13,700 m3 (17,900 yd3) equipment and industrial wastes. The site contains unsegregated waste only. The site contains 2.0 kg Pu, 900 kg U. 48,000 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 West Area
References	WIDS; WHC-EP-0912; RHO-CD-673; SWITS

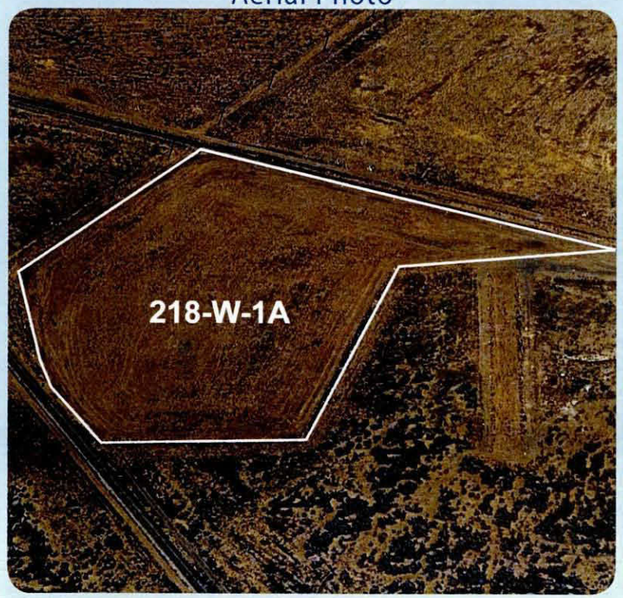
218-W-1A Site Map



Geophysical Anomalies



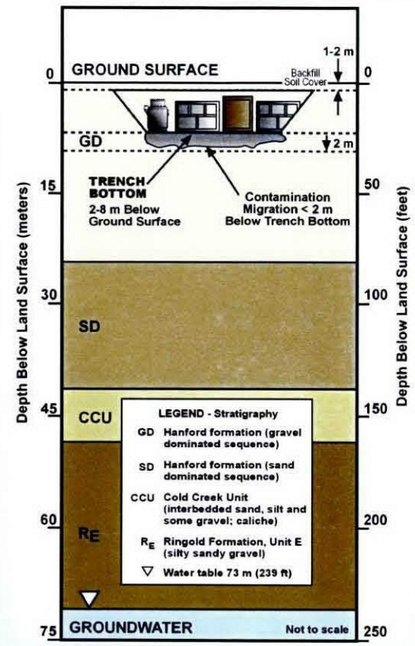
Aerial Photo



Characterization Summary

218-W-1A

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Landfill contains a large number of small, scattered shallow anomalies that confound the interpretation of distinct burial trenches in the GPR data. For this reason, concentrations of buried debris are inferred primarily from EMI and magnetic data.
  - o See Section 3 for results



- High internal void volume
- High potential for subsidence
- Disposal of failed/obsolete equipment
- High dose rates
- Waste typically contained in large wooden or concrete boxes

Figure E-22. Initial CSM for the 218-W-2 Landfill.

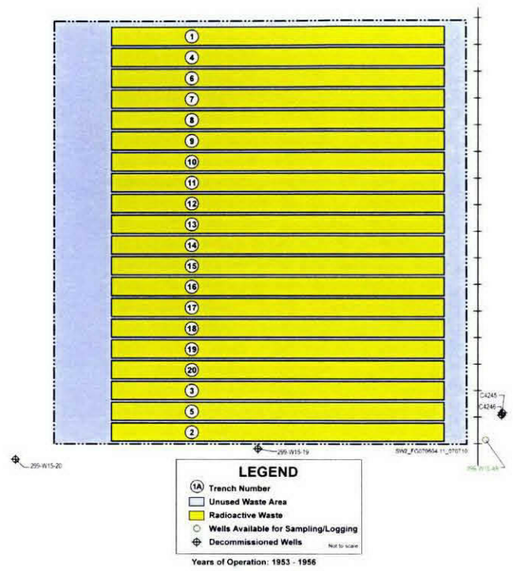
218-W-2

Bin 3 Dry Waste Alpha Landfill

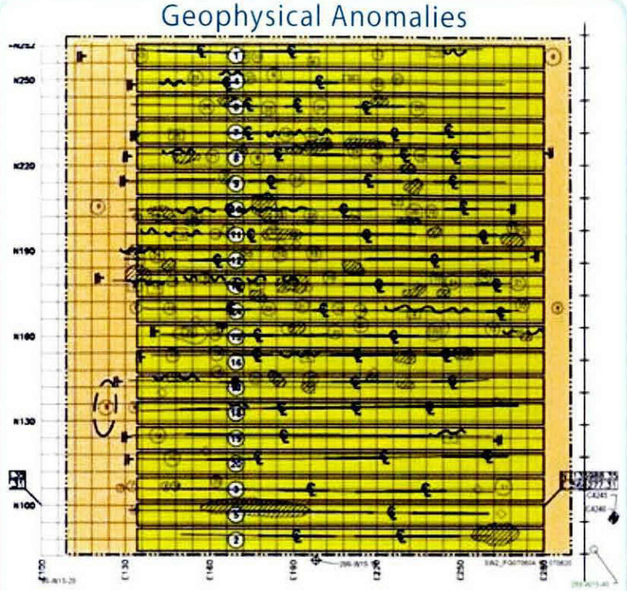
Landfill Summary Information

WIDS Code & Aliases	218-W-2, 200-W Area Dry Waste No. 002, Dry Waste Burial Ground No. 2
Landfill Type	Dry Waste
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1953 to 1956
Area & Shape	3.45 ha (8.51 acres) - rectangle
Location	Northwest of the 234-5Z Building between 218-W-4B and 218-W-1
General Description	Before backfilling, waste was observed to be within 46 cm (18 in.) of the ground surfaces. Sinkholes were filled in 1974. The site was surface stabilized in 1983 with a minimum of 0.6 m (2 ft) of clean fill and vegetated. A surface radiological survey is performed annually.
Trenches	The site is a landfill that contains 20 trenches running east to west.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	8,240 m3 (10,778 yd3) dry waste. The site contains unsegregated waste only. The site contains 126 kg Pu, 1400 kg U. 500 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 West Area
References	WIDS; H-2-2503; BHI-00175; SWITS

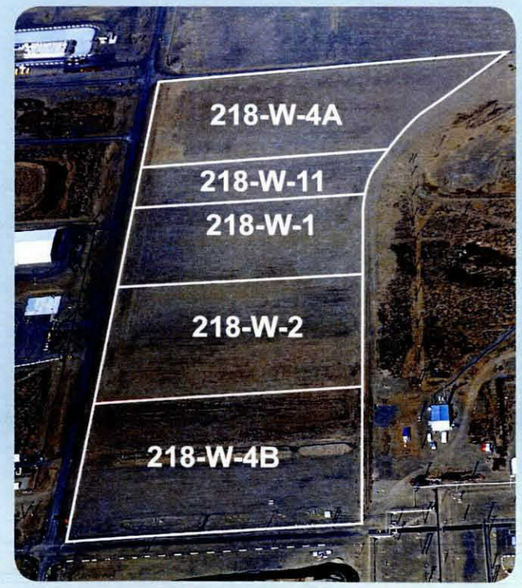
218-W-2 Site Map



Geophysical Anomalies



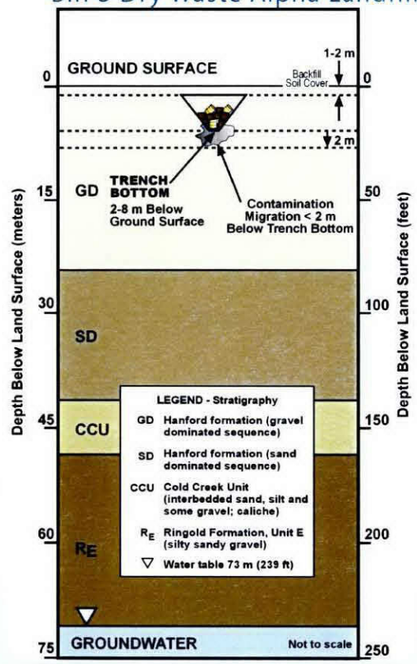
Aerial Photo



Characterization Summary

218-W-2

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o All 20 of the trenches in 218-W-2 were clearly evident in the geophysical data. The geophysical data indicates that pockets/ zones of debris are located and mapped in each of the identified trenches.
  - o See Section 3 for results



- One of four landfills believed to contain ~ 90% of the pre-1970 alpha contaminated LLW
- Waste primarily packaged in fiberboard cartons/boxes/drums
- Low potential for subsidence

Figure E-23. Initial CSM for the 218-W-2A Landfill.

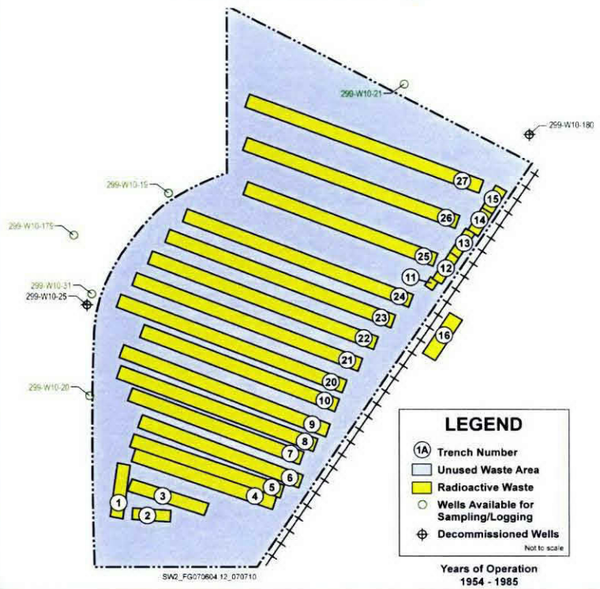
218-W-2A

Bin 2 Industrial Landfill

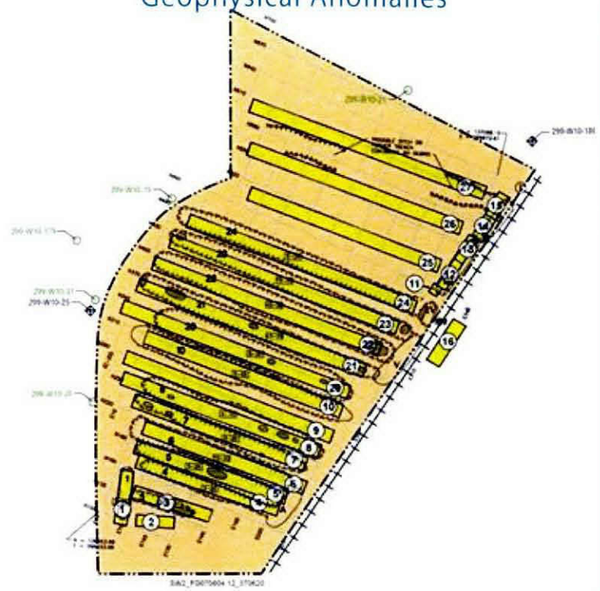
Landfill Summary Information

WIDS Code & Aliases	218-W-2A, Industrial Waste No. 02A, Equipment Burial Ground #2
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1954 to 1985
Area & Shape	16.5 ha (40.7 acres) - irregular shape
Location	West of the 221-T Building, north of 23rd St, and directly east of the 218-W-3 Landfill
General Description	Solid wastes disposed to the site includes tanks, concrete blocks, facility wastes, process equipment, contaminated soil scraped from the 216-T-4-1 Pond (Trench 27), REDOX centrifuges, jumpers, pumps, filters, and miscellaneous cell equipment and wastes. Trench 21 contains a plutonium glovebox. In January 1959, a contamination spread occurred when a burial box containing REDOX jumpers collapsed during backfill operations (UPR-200-W-53). The site was backfilled and surface stabilized in 1980. However, the site remained active until 1985 because of two unused trenches and the cell block burial sites. An undocumented burial box was discovered in June 1983 while extending an active trench. The site was re-stabilized with clean fill and gravel in 2001.
Trenches	The site is an industrial burial area with 19 trenches; 17 run east to west and 2 run north to south.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	25,100 m3 (32,800 yd3) equipment and industrial wastes. This site contains unsegregated and low-level wastes. The site contains 6.38 kg Pu, 2,690 kg U. 247,000 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 Area facilities including T-Pond soil, REDOX, B Plant, and 234-5Z
References	WIDS; H-2-32095; SWITS; 218-W-2A Logbook; ARH-2757; ARH-2015 Part 4; D&D-28379, Rev. 1

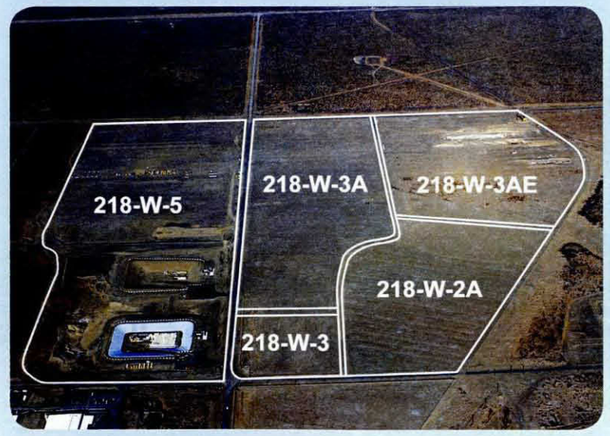
218-W-2A Site Map



Geophysical Anomalies



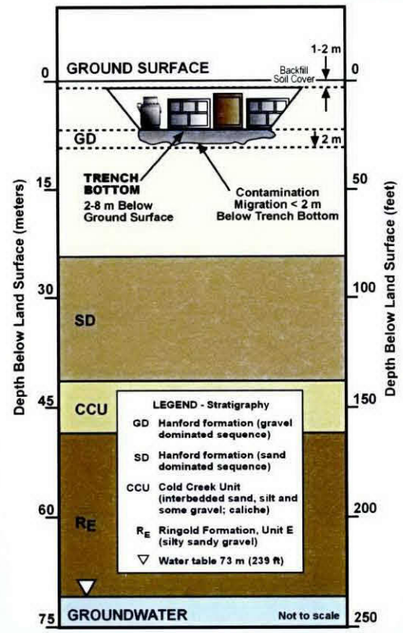
Aerial Photo



Characterization Summary

218-W-2A

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Data indicates that there are burial trenches at most of the locations shown for trenches on Hanford Site Drawing H-2-32095. Most of the debris or objects in the trenches have a ferrous metal content; some have a significant ferrous content.
  - o See Section 3 for results



- High internal void volume
- High potential for subsidence
- Disposal of failed/obsolete equipment
- High dose rates
- Waste typically contained in large wooden or concrete boxes
- 216-T-4A used to occupy the northern portion of landfill contained 216-T-4A ditch; ditch use discontinued to expand landfill; 216-T-4A ditch will be investigated by 200-MG-2 OU

Figure E-24. Initial CSM for the 218-W-3 Landfill.

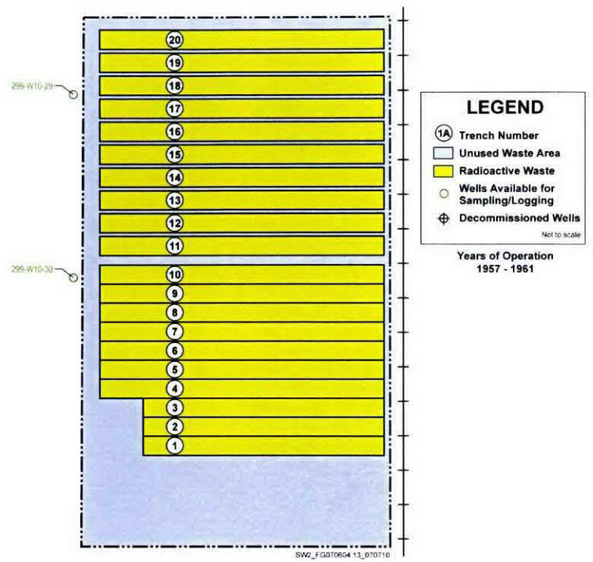
218-W-3

Bin 3 Dry Waste Alpha Landfill

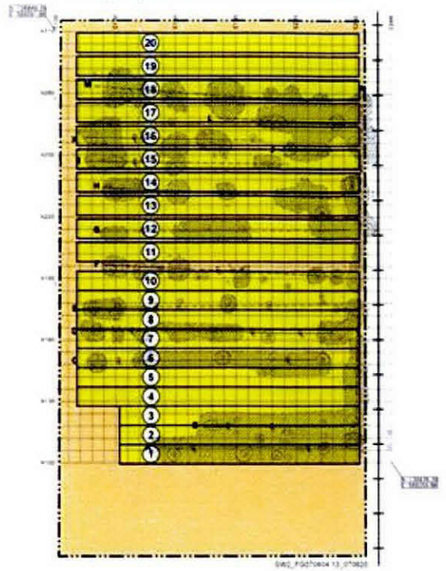
Landfill Summary Information

WIDS Code & Aliases	218-W-3, Dry Waste No. 003
Landfill Type	Dry Waste
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1957 to 1961
Area & Shape	3.97 ha (9.81 acres) - irregular shape
Location	West of the 221-T Building and directly west of the 218-W-2A Landfill
General Description	The site received miscellaneous unsegregated wastes including drums of depleted uranium, a 1951 pickup truck, and other miscellaneous items, mainly in cardboard boxes. The site is backfilled and was surface stabilized in 1983. A surface radiological survey is performed annually.
Trenches	Although drawings (H-2-32095, Sheet 1, Rev. 11) indicate that the site consists of 20 east-west trenches that range from 122 m to 145 m (400 ft to 475 ft) long with unknown widths, geophysical data collected in 2006 (D&D-30708) and unpublished 1960s logbook evidence show both east-west and north-south trenches that are different in location and differently numbered.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	12,400 m3 (16,220 yd3) mostly dry wastes buried with some equipment. This site contains unsegregated wastes only. The site contains 68 kg Pu, 70,000 kg U. 900 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	PFP
References	WIDS; H-2-32095; D&D-30708; SWITS; 218-W-3 Logbook

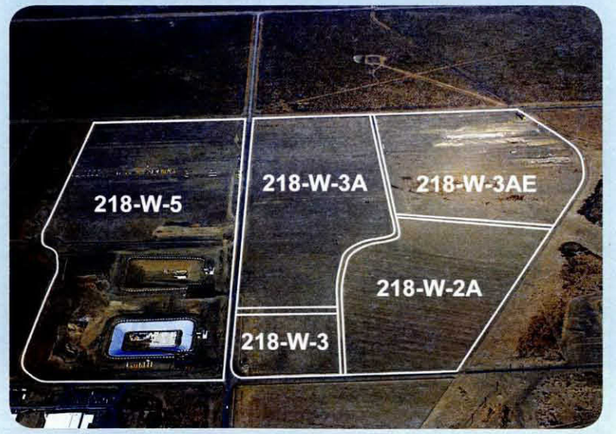
218-W-3 Site Map



Geophysical Anomalies



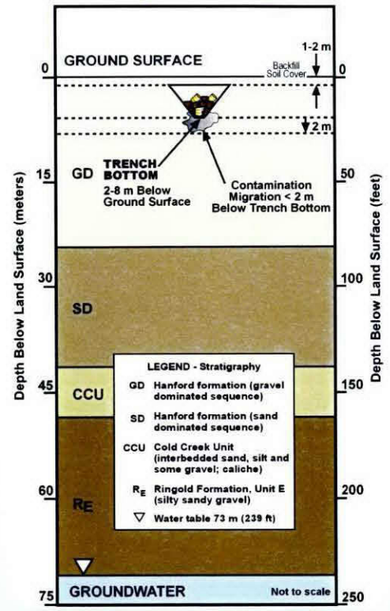
Aerial Photo



Characterization Summary

218-W-3

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Geophysical data for-218-W-3 indicates that there are approximately 14 East-West oriented trenches containing varying amounts of metallic debris. Other than the two southernmost trenches, the interpreted trench locations do not correlate with the locations shown in drawings.
  - o See Section 3 for results



- One of four landfills believed to contain ~ 90% of the pre-1970 alpha contaminated LLW
- Waste primarily packaged in fiberboard cartons/boxes/drums
- Low potential for subsidence

Figure E-25. Initial CSM for the 218-W-3A Landfill.

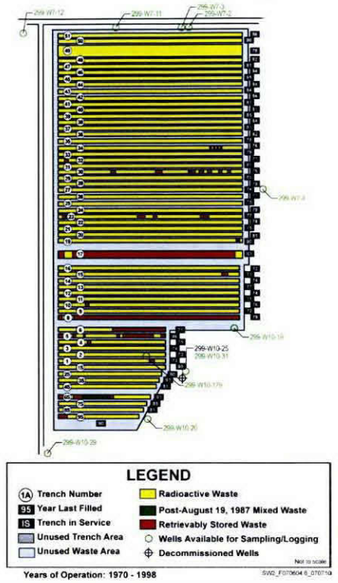
218-W-3A

Bin 1 TSD Unit Landfill

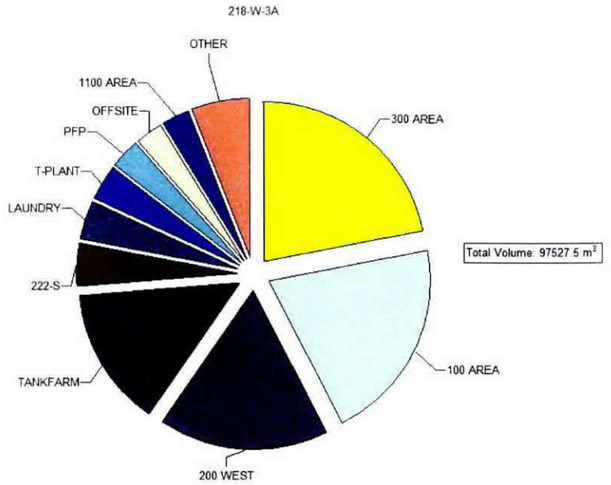
Landfill Summary Information

WIDS Code & Aliases	218-W-3A
OU & Category	200-SW-2, TSD Unit
Dates of Waste Receipt	1970 to 1998
Area & Shape	21.9 ha (54.2 acres) - irregular shape
Location	West of the 221-T Building and north of 218-W-3 Landfill
General Description	The site was designed to contain 61 trenches running in an east to west direction. Four trenches have not been dug, and the 57 that have been constructed range from 127 m to 284 m (417 ft to 930 ft) in length. 97,500 m3 (127,500 yd3) dry waste and some equipment. The site contains TRU, TRUM, LLW, MLLW, and unsegregated wastes. The site contains 0.55 kg Pu, 634 kg U. 1,330,000 Ci Beta-Gamma at burial. Chemicals in wastes disposed to the in-scope trenches or portions of trenches (LLW, MLLW, and unsegregated wastes) include: 1,2,4-trimethylbenzene; acetic acid, butyl ester; acetonitrile; aliquat 336; anase; asbestos; barium; batteries; beryllium; cadmium; carbon tetrachloride; carcinogens; caustic; charcoal; chromium; coal tar; copper; cortisporin; cyclohexane; cyclohexanone; dibutyl phosphate; dibutyl-n,n-diethylcarbomyl phosphate; dioxane (1,4-diethylene dioxide); ethanol; ethanolamine; ethylene glycol; glycerin; isopropyl alcohol; kerosene; lead; lithium fluoride; mercury; methanol; naphthalene; napthylamine tritium; n-hexane; n-hexanol; nitric acid; normal paraffins; oil; organic; phosphoric acid; polyurethane; pseudocumene; silver; silver nitrate; slaked lime; sodium; sodium hydroxide; solvents; tetrahydrofuran; toluene; tributyl phosphate; trichloroethylene; trichlorofluoromethane; trioctylphosphine oxide; uranium fluoride; xylene (mixed isomers); zinc; zirconium
Trenches	100 Area, 200 West Area, 300 Area, PFP, Tank Farms
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	WIDS; H-2-34880 Sheet 1; H-2-34880 Sheet 2; DOE/RL-88-21 Release 22 Low Level Burial Grounds Rev. 11 12/23/98; WHC-EP-0912; RHO-CD-673

218-W-3A Site Map



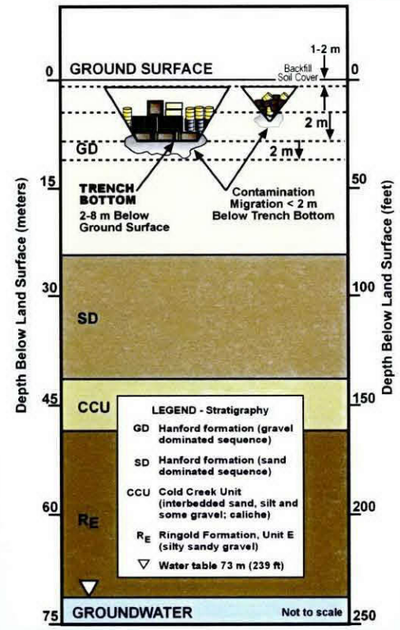
Relative Volume of Waste by Generator



Aerial Photo

Characterization Summary

- Historical documentation review
  - See Section 5 for a summary of the review process
- Passive soil vapor surveys
  - Specific sampling locations were chosen based on detailed reviews of engineering drawings, historical documents, and waste burial record information located in the SWITS database.
  - Samples were analyzed for the presence of 28 organic compounds identified to be contaminants of potential concern.
  - Two sample locations had CCl4 levels greater than 100 nanograms: trench 3-S had a reading of 149 nanograms; at another location, trench 9-S had a CCl4 level of 1,185.
  - See Section 3 for results
  - Passive soil vapor sampling was also conducted by 200-PW-1 in 218-W-3A.
- Vent riser vapor samples
  - Performed on retrievably stored TRU waste trench segments; although this waste is not in the scope of this investigation, these results are included in this RI/FS work plan for completeness.
  - See Section 3 for results
  - Vent riser sampling in non-RSW trenches was also conducted by 200-PW-1 in 218-W-3A.
- RCRA groundwater monitoring
  - LLWMA 3- monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site specific parameters as required by WAC 173-303-400(3).
  - See section 3 for results



- Under LLBG Dangerous Waste Permit Application - Part A
- Contains retrievably stored TRU waste (M-91 Project)
- Potential for small volume, sorbed, containerized liquids
- Potential for subsidence
- High dose rates
- Temporarily flooded in past due to rapid snow melt

Figure E-26. Initial CSM for the 218-W-3AE Landfill.

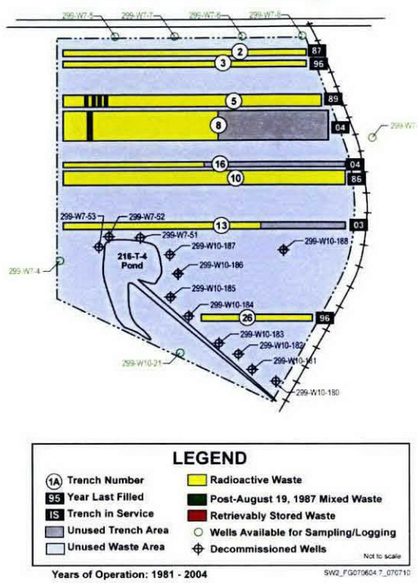
218-W-3AE

Bin 1 TSD Unit Landfill

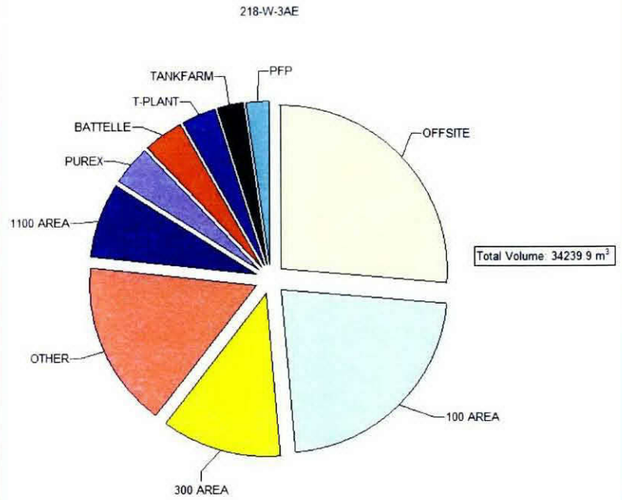
Landfill Summary Information

WIDS Code & Aliases	218-W-3AE, Industrial Waste No. 3AE, Dry Waste No. 3AE
Landfill Type	Industrial
OU & Category	200-SW-2, TSD Unit
Dates of Waste Receipt	1981 to 2004
Area & Shape	22.9 ha (56.6 acres) - irregular shape
Location	East and adjacent to the 218-W-3A Landfill in the 200 West Area
General Description	The location of this site also included a portion of the 216-T-4B Pond. The site received miscellaneous wastes including rags, paper, rubber gloves, disposable supplies, broken tools, laboratory wastes and industrial waste such as failed equipment, tanks, pumps, ovens, agitators, heaters, hoods, jumpers, decommissioned change trailers, etc. Trenches 5 and 8 contain post-1987 mixed waste.
Trenches	It originally was designed to contain 24 trenches. However, it was re-designed to contain only 12 trenches at deeper depths. Only eight of the trenches were excavated; three of these are only partially filled.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	34,300 m3 (44,900 yd3) of miscellaneous wastes. The site contains TRU, LLW, and MLLW. The TRU at this site will be removed and processed; it is not part of the TPA M-91 scope. The site contains 0.12 kg Pu, 439 kg U. 223,000 Ci Beta-Gamma at burial. Chemicals in wastes disposed to this site include aluminum nitrate; 2,4-dinotrotoluene; ammonium chloride; asbestos; beryllium; bis (2-ethylhexyl) phthalate; chromium; copper; dibutyl phosphate; ferric nitrate; ferrous ammonium sulfate; hydrobromic acid; lead; mercury; nickel hydroxide; nitrate; oil; polychlorinated biphenyls; potassium nitrate; silver; sodium hydroxide; sodium nitrate; sodium nitrite; sulfuric acid; tetrachloroethylene; trichloroethene; trichlorofluoromethane; zirconium.
Source Facilities Contributing More than 5% of Waste by Volume	100 Area, 1100 Area (1171 Transportation & Maintenance Building), 300 Area, Offsite
References	WIDS; H-2-75351; DOE/RL-88-21 Release 22 Low Level Burial Grounds Rev. 11 12/23/98; WHC-EP-0912

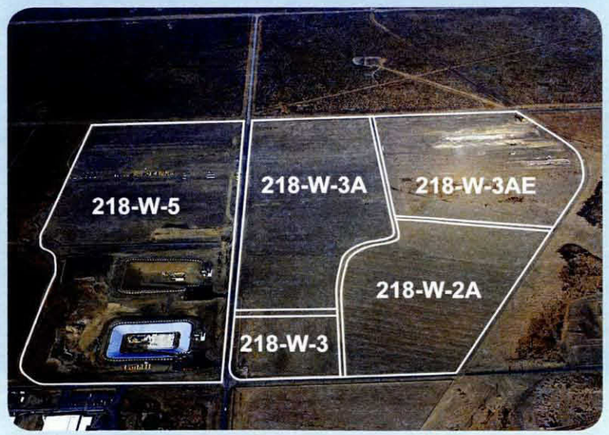
218-W-3AE Site Map



Relative Volume of Waste by Generator



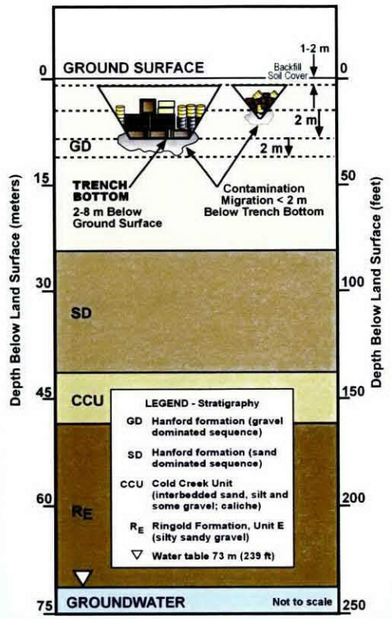
Aerial Photo



Characterization Summary

218-W-3AE

- Historical documentation review
  - See Section 5 for a summary of the review process
- Passive soil vapor surveys
  - Specific sampling locations were chosen based on detailed reviews of engineering drawings, historical documents, and waste burial record information located in the SWITS database.
  - Samples were analyzed for the presence of 28 organic compounds identified to be contaminants of potential concern.
  - See Section 3 for results
- RCRA groundwater monitoring
  - LLWMA 3- monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site specific parameters as required by WAC 173-303-400(3).
  - See section 3 for results



- Under LLBG Dangerous Waste Permit Application - Part A
- Potential for small volume, sorbed, containerized liquids
- Potential for subsidence
- High dose rates
- Old 216-T-4B pond/ditch contained within landfill boundary; being investigated by 200-CW-1 OU
- No trenches under M-91 Project

Figure E-27. Initial CSM for the 218-W-4A Landfill.

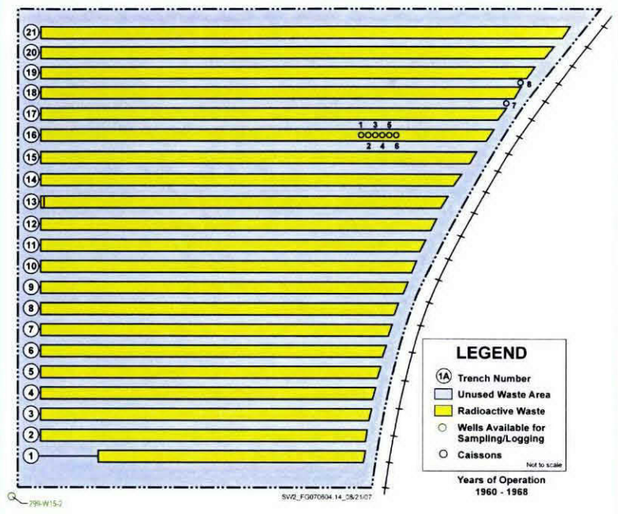
218-W-4A

Bin 3 Dry Waste Alpha Landfill

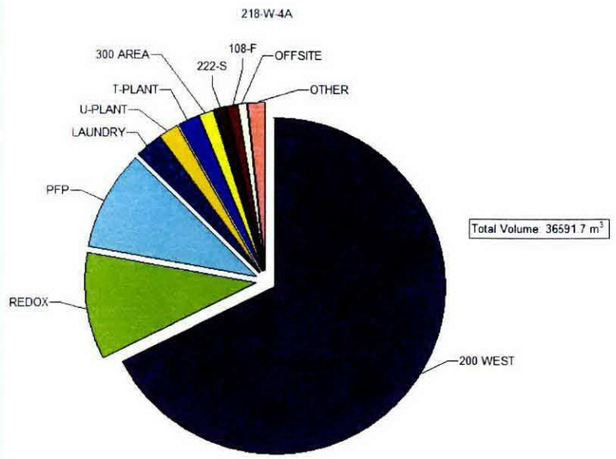
Landfill Summary Information

WIDS Code & Aliases	218-W-4A, Dry Waste No. 04A
Landfill Type	Dry Waste
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1960 to 1968
Area & Shape	7.29 ha (18.0 acres) - irregular shape
Location	Southeast of the intersection of 23rd St and Dayton Ave
General Description	The vertical pipe units were installed near the east end of Trench 16. Each consists of two 55-gal drums welded together with the ends removed except the bottom of the lower drums; they were placed 4.6 m (15 ft) bgs. After each drop containing waste, dirt was shoveled into the well to shield the gamma radiation. Two vertical pipe units as deep as 15 m (48 ft) may be located near the east end of Trench 18. No information has been found on their contents. Drawing H-2-32487 shows details of many individual burials. Unplanned releases to this site (Table B-2) include a fire in the landfill (UPR-200-W-16), spotty contamination release (UPR-200-W-26), a burial box collapse (UPR-200-W-53), and a release of previously buried waste (UPR-200-W-72). The site was stabilized in 1983.
Trenches	The site contains 21 trenches oriented east to west and six to eight vertical pipe units or drywells. In addition there is a special burial trench at the east end of Trench 11 containing a REDOX column. All trenches are 9 m (30 ft) wide, with 12.2 m (40 ft) between trench centerlines. They range in length from 153 m to 305 m (500 ft to 1000 ft).
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	16,700 m3 (21,800 yd3) dry wastes and some equipment. This site contains unsegregated wastes only. The site contains 35.4 kg Pu, 394,000 kg U. 3,820 Ci Beta-Gamma at burial.
Source Facilities Contributing More than 5% of Waste by Volume	200 West Area, PFP, REDOX
References	WIDS; H-2-33564; DOE/RL-88-21; H-2-32487; 218-W-4A Logbook; SWITS

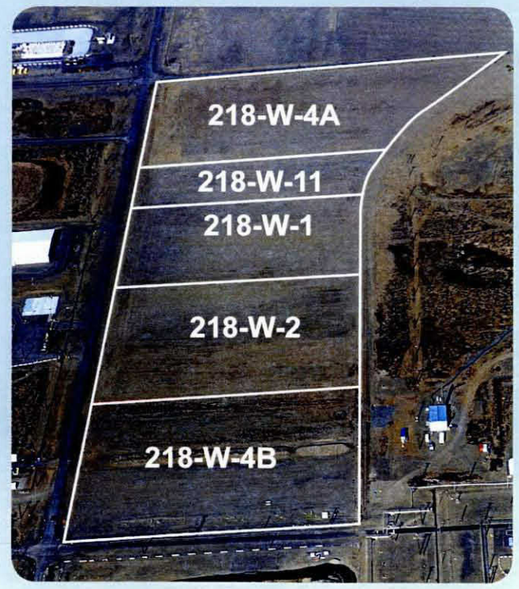
218-W-4A Site Map



Relative Volume of Waste by Generator



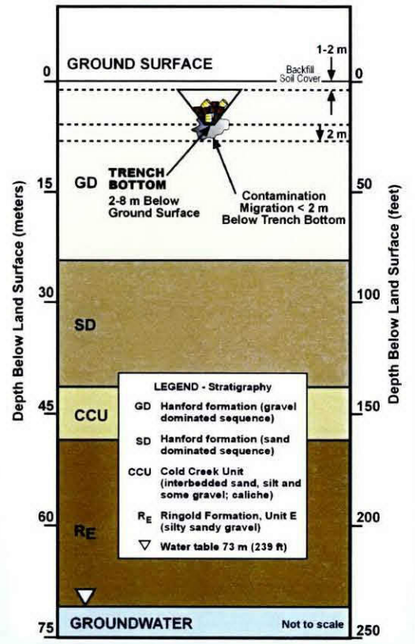
Aerial Photo



Characterization Summary

218-W-4A

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Five trenches were identified in the southern part of 218-W-4A during the geophysical investigation of 218-W-11 in June 2006.
  - o See Section 3 for results



- One of four landfills believed to contain ~ 90% of the pre-1970 alpha contaminated LLW
- Waste primarily packaged in fiberboard cartons/boxes/drums
- Low potential for subsidence
- Believed to contain 8 vertical pipe unit caissons; 4 are believed empty and require verification

Figure E-28. Initial CSM for the 218-W-4B Landfill.

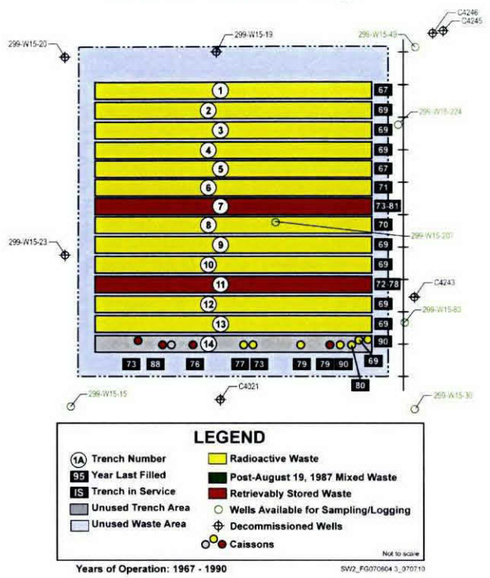
218-W-4B

Bin 1 TSD Unit Landfill

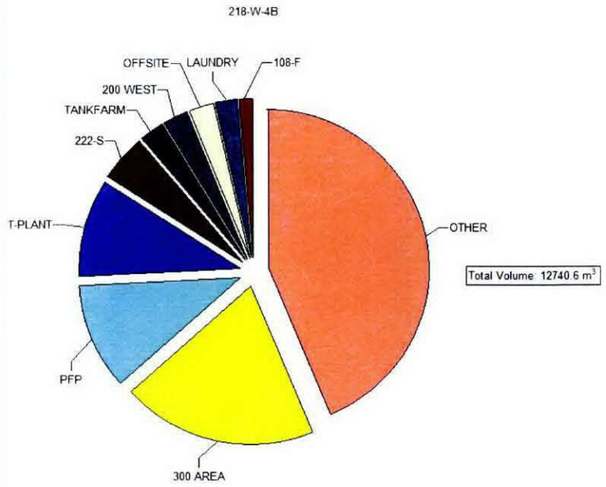
Landfill Summary Information

WIDS Code & Aliases	218-W-4B, Dry Waste No. 04B
Landfill Type	Dry Waste
OU & Category	200-SW-2, TSD Unit
Dates of Waste Receipt	1967 to 1990
Area & Shape	4.07 ha (10.1 acres) - rectangle
Location	Northwest of the 234-5Z Building, directly west of 231-Z Building
General Description	The site contains miscellaneous debris including rags, paper, cardboard, plastic, and equipment. Trenches 7 and 11 and the alpha caissons contain TRU waste planned to be retrieved under M-91. Four of the 5 alpha caissons were used from 1970 to 1979; the fifth is believed to be empty. The alpha and MFP caissons are up to 2.7 m (8.8-ft-) diameter, 3 m (10 ft) high concrete and/or corrugated steel containers with an access chute diameter of approximately 90 cm (36-in.-). The silo-type caisson is a 3 m (10-ft-) diameter, 9 m (30-ft-) tall container placed on a concrete foundation with a concrete shielding top slab; it has a 107 cm (42-in.-) diameter access chute. All caissons are equipped with air-filtering systems. Trenches 1 through 6 were surface stabilized and backfilled with clean soil in 1983. Trench 7 is covered with a 1.2 m (4 ft) soil mound. The remaining trenches were backfilled after use and stabilized with clean gravel in 1995.
Trenches	The site contains 13 trenches and one row of 12 caissons (5 alpha, 6 MFP, and 1 deeper, silo-type which became plugged after receipt of two waste packages).
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	10,466 m3 (13,690 yd3) of waste as of September 30, 2005. The site contains TRU, LLW, and unsegregated wastes. The site contains 8.98 kg Pu and 21.6 kg U. 406,000 Ci Beta-Gamma at burial. Chemicals in wastes disposed to the in-scope trenches or portions of trenches (LLW and unsegregated wastes) include: beryllium, lead, oil, and zirconium.
Source Facilities Contributing More than 5% of Waste by Volume	222-S, 300 Area, PFP, and T-Plant
References	WIDS; WHC-EP-0912; DOE/RL-88-21 Release 22 Low Level Burial Grounds Rev. 11 12/23/98; RHO-CD-0673; RHO Internal Letter 65462-80-035

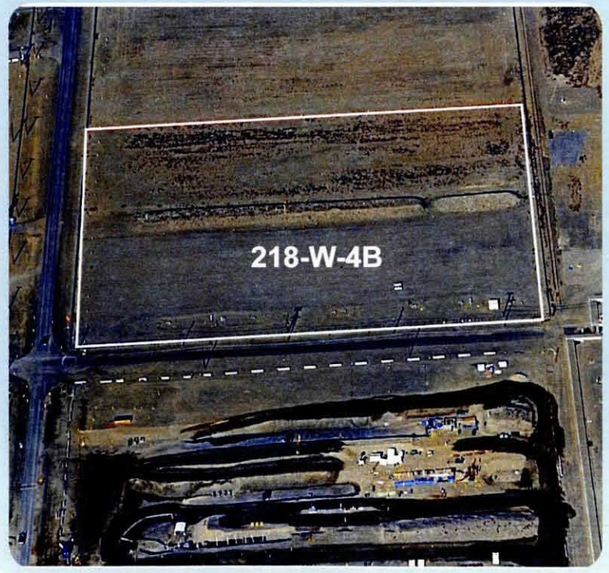
218-W-4B Site Map



Relative Volume of Waste by Generator



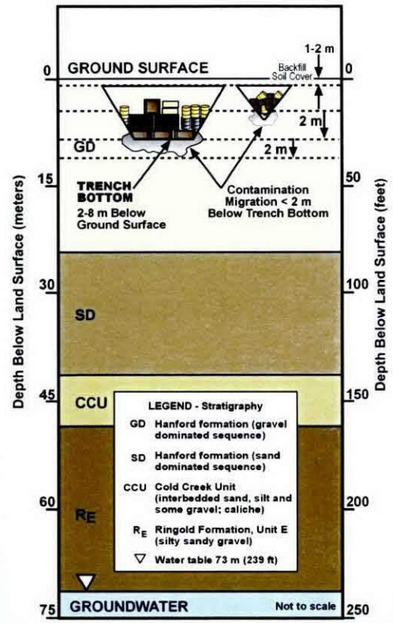
Aerial Photo



Characterization Summary

218-W-4B

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Passive soil vapor surveys
  - o Specific sampling locations were chosen based on detailed reviews of engineering drawings, historical documents, and waste burial record information located in the SWITS data base.
  - o Samples were analyzed for the presence of 28 organic compounds identified to be contaminants of potential concern.
  - o One sample location had CCl4 levels greater than 100 nanograms: targeted location, trench 8 had CCl4 levels in excess of 70,000 nanograms.
  - o See Section 3 for results
- Vent riser vapor samples
  - o Performed on retrievably stored TRU waste trench segments; although this waste is not in the scope of this investigation, these results are included in this RI/FS work plan for completeness.
  - o See Section 3 for results
- RCRA groundwater monitoring
  - o LLWMA 4- monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site specific parameters as required by WAC 173-303-400(3).
  - o See section 3 for results



- Under LLBG Dangerous Waste Permit Application - Part A
- Contains retrievably stored TRU waste (M-91 Project)
- Potential for small volume, sorbed, containerized liquids
- Potential for subsidence
- High dose rates
- Temporarily flooded in past due to rapid snow melt
- Contains 11 Caissons; 7 are in scope and 4 under M-91 Project

Figure E-29. Initial CSM for the 218-W-4C Landfill.

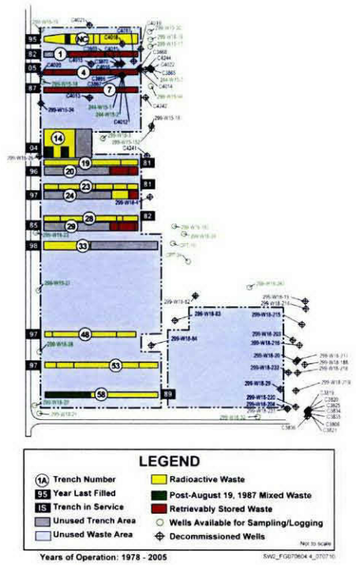
218-W-4C

Bin 1 TSD Unit Landfill

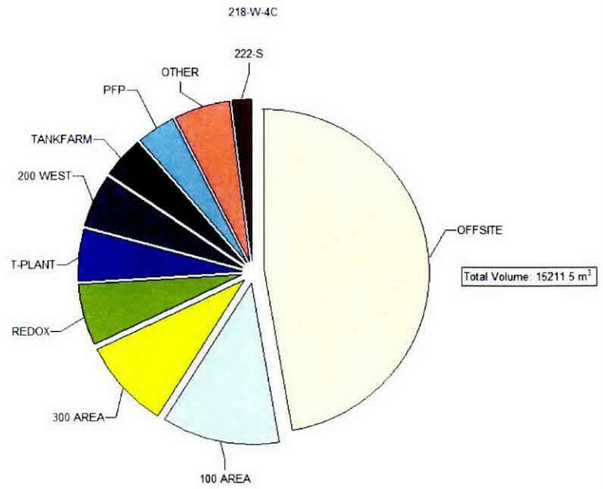
Landfill Summary Information

WIDS Code & Aliases	218-W-4C, Dry Waste No. 004C
Landfill Type	Dry Waste
OU & Category	200-SW-2, TSD Unit
Dates of Waste Receipt	1978 to 2005
Area & Shape	22.8 ha (56.2 acres) - irregular shape
Location	Main section located west and southwest of the 234-5Z Building, east of Dayton Ave. Annex is located directly south of the 234-5 Building, north of 16th St
General Description	The site is divided into two parts; the section containing burial trenches to the west and an annex, (which never has been used) to the east. The Z Plant burning pit, which operated during the late 1940s and early 1950s, was reportedly excavated in the 1970s during the construction of Trench 7. Some of the TRU-containing trenches are asphalt lined. Trenches 1, 4, 7, 20, 24, and 29 contain retrievably stored, suspect TRU waste. One drum of suspect TRU was buried in what is otherwise a LLW trench in 1981; records were later examined, and the drum and trench were redefined as containing only LLW. Trenches NC, 14, and 58 contain post-1987 mixed waste.
Trenches	The landfill is designed to contain up to 65 trenches. Only 14 trenches have been excavated; 6 of these are only partially filled. The landfill annex area never has been used. The trenches run east to west and range in length from 50 m to 232 m (162 ft to 760 ft).
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	15,200 m3 (19,900 yd3) of waste as of September 30, 2005. The site contains TRU, TRUM, LLW, and MLLW. The site contains 0.026 kg Pu, 215 kg U. 1,100,000 Ci Beta-Gamma at burial. Chemical in wastes disposed to the in-scope trenches or portions of trenches (LLW/MLLW) include: 1,2-diaminopropane; 1-butene; 2,2,4-trimethylpentane; 3,4(benz-3,6)pyrene; acetic anhydride; acetophenone; acid; chromium; coal tar; copper; cumene hydroperoxide; di-t-butyl-p-cresol; indole picrate; isopropyl iodide; lead; mercury; n,n-disalicylidene; naphthalene; 2-methyl-naphthalene; oil; paint thinner; phenol; silver; slaked lime; sodium; t-butyl hydroperoxide; uranium fluoride; vinyl chloride (chloroethylene); zirconium
Source Facilities Contributing More than 5% of Waste by Volume	100 Area, 300 Area, Offsite, PFP, REDOX
References	WIDS; DOE/RL-88-21 Release 22 Low Level Burial Grounds Rev. 11 12/23/98

218-W-4C Site Map



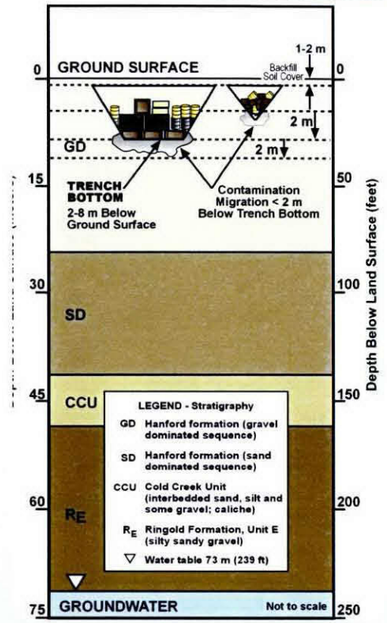
Relative Volume of Waste by Generator



Aerial Photo

Characterization Summary

- Historical documentation review
  - See Section 5 for a summary of the review process
- Passive soil vapor surveys
  - Specific sampling locations were chosen based on detailed reviews of engineering drawings, historical documents, and waste burial record information located in the SWITS database.
  - Samples were analyzed for the presence of 28 organic compounds identified to be contaminants of potential concern.
  - See Section 3 for results
- Vent riser vapor samples
  - Performed on retrievably stored TRU waste trench segments; although this waste is not in the scope of this investigation, these results are included in this RI/FS work plan for completeness.
  - See Section 3 for results
  - Vent riser sampling was also conducted by 200-PW-1 in 218-W-4C.
- Soil vapor samples
  - See Section 3 for results
- RCRA groundwater monitoring
  - LLWMA 4- monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site specific parameters as required by WAC 173-303-400(3).
  - See section 3 for results

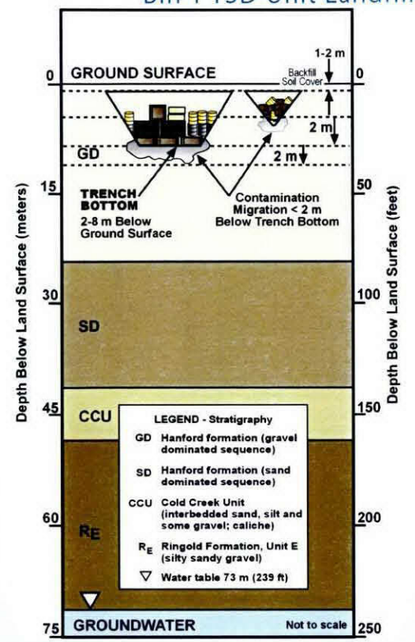


- Under LLBG Dangerous Waste Permit Application - Part A
- Contains retrievably stored TRU waste (M-91 Project)
- Potential for small volume, sorbed, containerized liquids
- Potential for subsidence
- High dose rates
- Temporarily flooded in past due to rapid snow melt
- Eastern portion believed unused; will be verified by field walk downs and/or geophysics.
- Trench NC contains components from the Department of the Navy and is out of scope

Figure E-30. Initial CSM for the 218-W-5 Landfill.

218-W-5

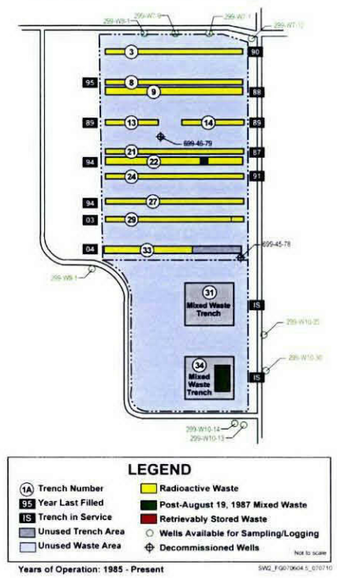
Bin 1 TSD Unit Landfill



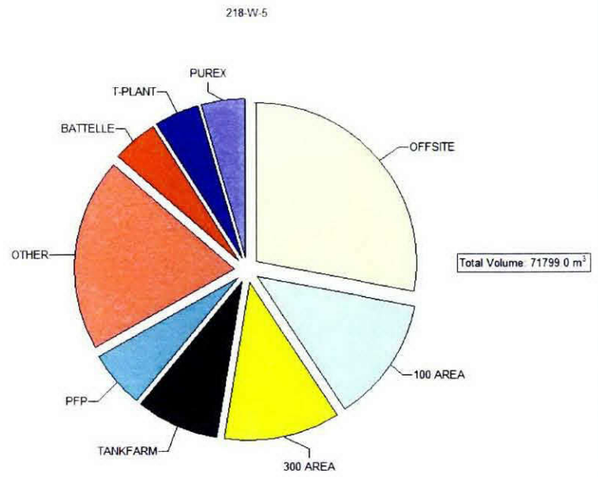
Landfill Summary Information

WIDS Code & Aliases	218-W-5, Dry Waste Burial Ground, Low-Level Radioactive Mixed Waste Burial Grounds
Landfill Type	Dry Waste
OU & Category	200-SW-2, TSD Unit
Dates of Waste Receipt	1985 to present
Area & Shape	38.6 ha (95.3 acres) - irregular shape
Location	West of Dayton Ave and north of 23rd St
General Description	Trenches 22 and 24 contain post-August 19, 1987 mixed waste.
Trenches	The Landfill is designed to contain 18 low-level and four mixed waste trenches. Currently there are 11 inactive low-level trenches. In addition, the only two currently active RCRA compliant lined mixed waste trenches within the LLBG TSD are located at this landfill (Trenches 31 and 34). The RCRA-compliant trenches are out of scope of this project.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	71,000 m3 (92,900 yd3) of total wastes as of September 30, 2005. This site contains LLW and MLLW. The site contains 0.17 kg Pu, 6,915 kg U. 31,400 Ci Beta-Gamma at burial. Chemicals in wastes disposed to the in-scope trenches (i.e., all trenches except 31 and 34) include lead, oil, and slaked lime.
Source Facilities Contributing More than 5% of Waste by Volume	100 Area, 300 Area, Offsite, PFP, Tank Farms
References	WIDS; DOE/RL-88-21 Release 22 Low Level Burial Grounds Rev. 11 12/23/98

218-W-5 Site Map



Relative Volume of Waste by Generator



Aerial Photo

Characterization Summary

218-W-5

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Passive soil vapor surveys
  - o Specific sampling locations were chosen based on detailed reviews of engineering drawings, historical documents, and waste burial record information located in the SWITS database.
  - o Samples were analyzed for the presence of 28 organic compounds identified to be contaminants of potential concern.
  - o See Section 3 for results
- RCRA groundwater monitoring
  - o LLWMA 3- monitoring wells have been sampled since 1988 for contaminant indicator parameters, groundwater quality parameters, drinking water parameters, and site specific parameters as required by WAC 173-303-400(3).
  - o See section 3 for results

- Under LLBG Dangerous Waste Permit Application - Part A
- Potential for small volume, sorbed, containerized liquids
- Potential for subsidence
- High dose rates
- Contains two RCRA compliant trenches (31 & 34); out of scope
- No trenches under M-91 Project

Figure E-31. Initial CSM for the 218-W-11 Landfill.

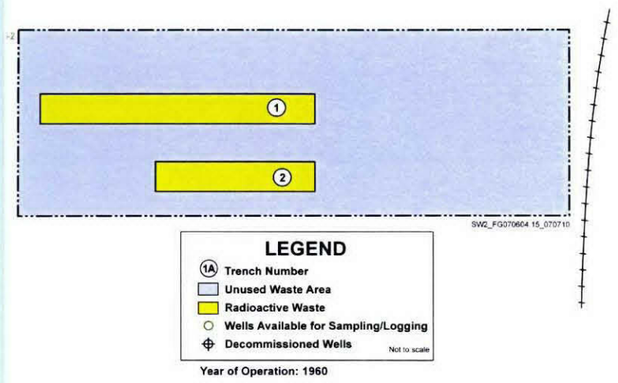
218-W-11

Bin 2 Industrial Landfill

Landfill Summary Information

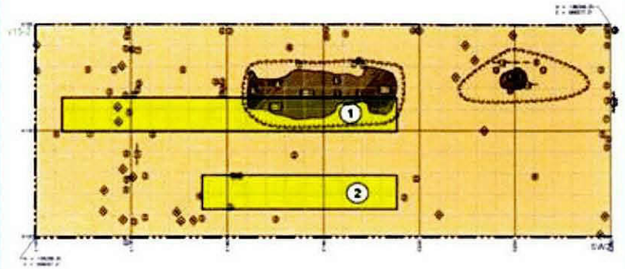
WIDS Code & Aliases	218-W-11, Regulated Storage Site
Landfill Type	Industrial
OU & Category	200-SW-2, past practice
Dates of Waste Receipt	1960
Area & Shape	1.43 ha (3.53 acres) - rectangle
Location	Northwest of the 234-5Z Building and north of 218-W-1
General Description	Before stabilization in 1983, a portion of the landfill was used for above-ground storage of contaminated equipment. The waste is low-level contaminated equipment. A surface radiological survey is performed annually.
Trenches	Two burial trenches 77 m (258 ft) and 46 m (150 ft) long. Sources conflict as to whether the southernmost of the two trenches ever was excavated and filled. Geophysics data collected in 2006 (D&D-30708) suggest that the trench does not exist.
Waste Volume, Pu/U Inventory, and Contaminant Inventory (In-Scope Low-Level & Unsegregated Wastes only)	1,160 m3 (1,520 yd3) miscellaneous solid debris. The site contains unsegregated wastes only. No plutonium, uranium, or beta-gamma inventories are reported for this site.
Source Facilities Contributing More than 5% of Waste by Volume	Tank Farms - Uranium Recovery Process and Sr/Cs Recovery Operations
References	WIDS; H-2-94250; BHI-00175; SWITS

218-W-11 Site Map



Year of Operation: 1960

Geophysical Anomalies

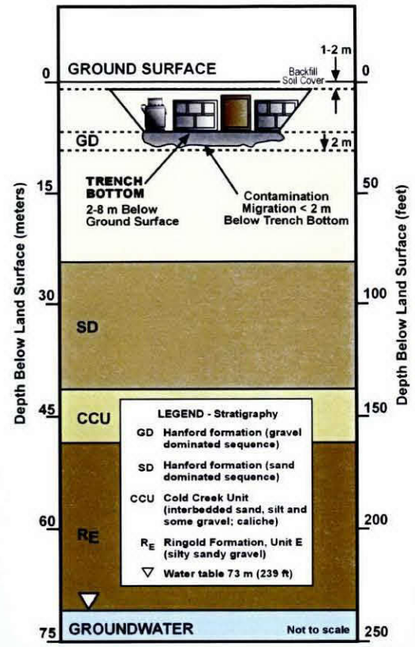


Aerial Photo

Characterization Summary

218-W-11

- Historical documentation review
  - o See Section 5 for a summary of the review process
- Surface geophysical surveys
  - o Geophysical data indicates that the investigation area contains two concentrations of buried debris or objects. One trench and one "pit" make up the 218-W-11 Landfill. The trench location correlates very well with the trench documented in Hanford Site Drawing H-2-31268.
  - o See Section 3 for results



- Internal void volume
- Potential for subsidence
- Disposal of failed/obsolete equipment
- Used for above ground storage of waste

Figure E-32. Initial CSM for the 218-W-4A & 218-W-4B Caissons.

Caissons

218-W-4A
218-W-4B

Caisson Summary Information

Vertical Pipe Units in 218-W-4A

The 218-W-4A landfill contains 21 miscellaneous dry waste trenches oriented east to west and six or eight vertical pipe unit style caissons. A grouping of six vertical pipe units were installed near the east end of Trench 16 and reportedly consist of five 55-gal drums welded together with the lids and bottoms removed and were installed 4.6 m (15 ft) below ground surface. Two deeper vertical pipe caissons may be located between the eastern end of Trenches 17, 18, and 19 and burried to depths of 16 m (48 ft).

Caissons in 218-W-4B

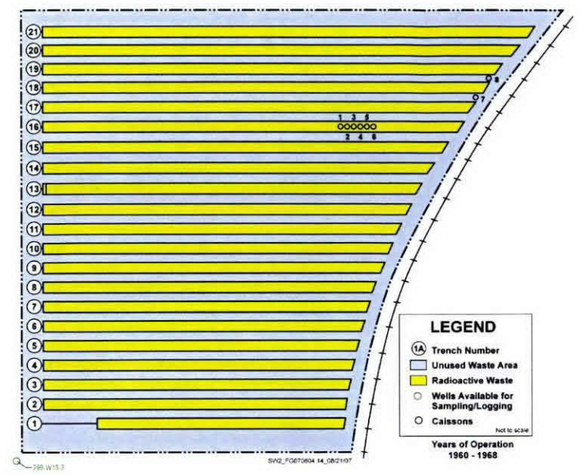
The caissons contained within the 218-W-4B landfill were used for disposal of alpha and MFP containing waste.

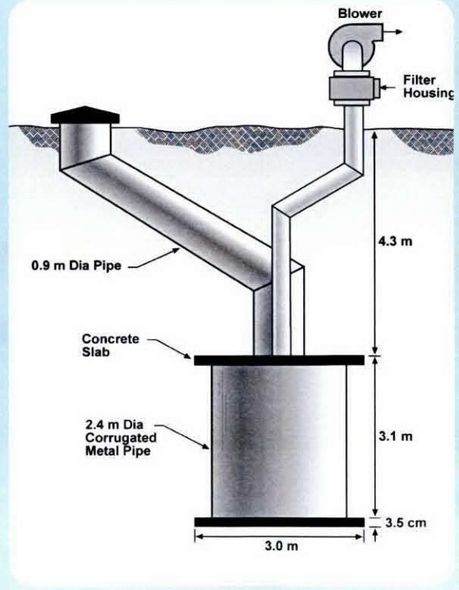
Caissons 1 through 5 (also called alpha caissons) were planned for TRU waste and are considered out of scope for 200-SW-2. From 1970 to 1988, retrievably stored TRU waste was placed in four of the five caissons, caisson Alpha #5 has never been used. The five alpha caissons are approximately 2.7 to 3 m (8.75 to 10 ft) in diameter, 3 m (10 ft) high concrete and steel covered vaults with steel lifting lugs and a 0.9 m (3 ft) diameter access chute. The alpha caissons weigh approximately 11,800 kg (26,000 lb).

Six general (also called dry waste or MFP) caissons containing LLW were filled from 1968 to 1979. Dry waste or MFP-type caissons are 2.4 m (8 ft) in diameter and 3.1 m (10 ft) high. According to WIDS, two of these caissons were constructed the same way as the alpha caissons, except with corrugated metal instead of steel and concrete fer the upright cylinder. The last shipment of caisson waste in 218-W-4B was deposited into MFP Caisson #6 in 1990.

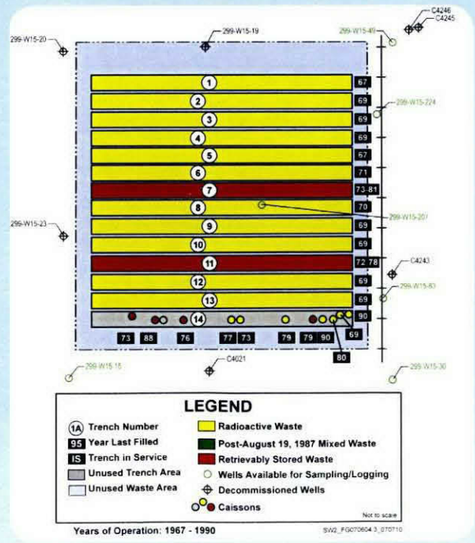
There is one caisson noted in the literature as a United Nuclear Industries (UNI) below grade silo-type caisson used for high-activity N Reactor waste. The UNI silo-type caisson is 3 m (10 ft) in diameter and 9 m (30 ft) tall with corrugated pipe containers placed on a concrete foundation with a top concrete shielding slab. It has a 1.1 m (3.5 ft) diameter access chute. Waste is placed beneath a concrete slab 4.6 m (15 ft) below grade. The chute of this caisson was plugged shortly after it began receiving waste and was taken out of service after plugging.

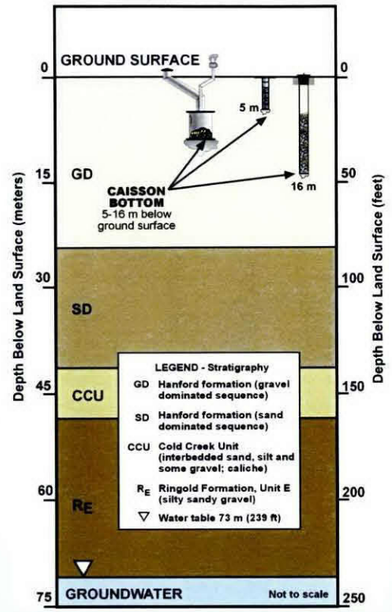
218-W-4A Site Map





218-W-4B Site Map





- Located in 218-W-4A and 218-W-4B landfills
- Vertical pipe units located in 218-W4A
- Caissons located in 218-W-4B
- High dose rate
- Typically remote handled waste
- Small containers (1-5 gallons cans)
- High beta-gamma radiation
- Potential for small volumes of sorbed organics (lab packs)
- 4 of 19 caissons in M-91 Project scope (not 200-SW-2 scope)
- 4 Caissons are possibly unused

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